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**PIRE INFORMATION REQUIREMENTS FOR CIVIL DEFENSE  
COMMAND AND CONTROL**

by

M. A. Sullivan

**U.S. NAVAL RADIOLOGICAL  
DEFENSE LABORATORY**

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ADMINISTRATIVE INFORMATION

This work was done for the Office of Civil Defense, Department of the Army - OSA under TO 65-20 Work Unit 2523E through the Civil Defense Technical Group, U.S. Naval Radiological Defense Laboratory, San Francisco, California.

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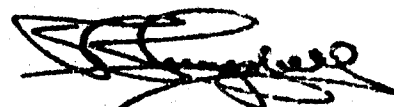
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D.C. Campbell, CAPT USN  
Commanding Officer and Director

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## SUMMARY PAGE

FIRE INFORMATION REQUIREMENTS FOR CIVIL DEFENSE COMMAND AND CONTROL, USNRDL TR-67-52, BY M.A. SULLIVAN, 4 APRIL 1967.

### THE PROBLEM

What are the elements of civil defense requiring transattack and postattack fire information, and what is the nature of the information needed, particularly by these elements of civil defense most directly concerned with fire-control operations?

### FINDINGS

The local-level civil defense organization rather than the state or national level, is the civil defense level concerned with transattack and immediate postattack fire operations. Ideally, the Emergency Operating Centers (EOC's) will receive fire information by monitoring the Fire Department radio channels, thus permitting accomplishment of two functions (1) support of fire-control operations and (2) coordination of other emergency operations (e.g., treatment of casualties and shelter evacuation) in which fire conditions must be taken into account. State, Regional, and Federal civil defense levels have postattack damage-assessment missions which will not require early or detailed fire information. Mutual-aid measures (from community to community) will probably not be effective because of the magnitude of a nuclear attack.

### RECOMMENDATIONS

1. Since local conditions (topography, distribution of fuel, availability of access routes, availability of firefighting personnel, equipment and water, proximity to military bases, etc.) will be overwhelmingly significant in determining details of fire-information requirements for specific cases and specific assumed attacks, it is recommended that further studies of this type be relegated to those involved in planning at the local EOC level.

2. In any such studies, the use of aerial photography and photointerpretation (to obtain a bomb's-eye view of the region of concern), will be a very useful technique and should be used.

# ABSTRACT

By assuming a hypothetical nuclear attack on various targets in the United States, including two in the vicinity of San Francisco, elements of civil defense operations requiring transattack and postattack fire information are identified. Through the assessment of probable types of fire operations within the framework of the assumed attack, the types and volume of fire information at the local level are summarized. It is concluded that less information, of a more general nature, is needed at the State, Regional, and Federal levels.

## SUMMARY

### THE PROBLEM

What are the elements of civil defense requiring transattack and postattack fire information, and what is the nature of the information needed, particularly by these elements of civil defense most directly concerned with fire-control operations?

### FINDINGS

The local-level civil defense organization rather than the state or national level, is the civil defense level concerned with transattack and immediate postattack fire operations. Ideally, the Emergency Operating Centers (EOC's) will receive fire information by monitoring the Fire Department radio channels, thus permitting accomplishment of two functions (1) support of fire-control operations and (2) coordination of other emergency operations (e.g., treatment of casualties and shelter evacuation) in which fire conditions must be taken into account. State, Regional, and Federal civil defense levels have postattack damage-assessment missions which will not require early or detailed fire information. Mutual-aid measures (from community to community) will probably not be effective because of the magnitude of a nuclear attack.

### RECOMMENDATIONS

1. Since local conditions (topography, distribution of fuel, availability of access routes, availability of firefighting personnel, equipment and water, proximity to military bases, etc.) will be overwhelmingly significant in determining details of fire-information requirements for specific cases and specific assumed attacks, it is recommended that further studies of this type be relegated to those involved in planning at the local EOC level.

2. In any such studies, the use of aerial photography and photo-interpretation (to obtain a bomb's-eye view of the region of concern), will be a very useful technique and should be used.

3. Planning for postattack operations should incorporate the concept that fire information needed by the EOC's should be obtained in the transattack and early postattack phases through intimate contact with the fire-control operation itself (which is the responsibility of the existing community fire departments), and constant monitoring of the Fire Department radio channels. Separate reporting systems for such information should not be established.

4. In combatting fires of the extent expected in a nuclear attack, the communications burden will be extremely high. Consequently, consideration should be given in planning by all communities to the line load control method described in the report.

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## GLOSSARY

Regional Headquarters Coordinator: The Regional Headquarters Coordinator is the Emergency Chief of one of the six geographical regions into which the State of California has been divided for emergency purposes. These regions are composed of many operational areas. He may also be the Regional Fire Coordinator and/or the Regional Fire dispatcher.

Area Headquarters Coordinator: The Area Headquarters Coordinator performs functions which are similar to those of the Regional Headquarters except that his responsibilities are for an operational area (i.e., a geographical subdivision of a region).

Dispatcher: A dispatcher assigns firemen and fire equipment to fire areas. Dispatchers, state, regional, and local perform this function in accordance with their respective responsibilities.

Fire Chief: A fire chief is responsible for developing fire disaster plans, organizing and controlling fire fighting resources for which he is responsible.

Command Post Chief: Directs fire fighting operations during large fires. He is usually the senior fire officer at the fire scene (see Section 6 for additional information).

Central Fire Alarm Office: In San Francisco, the Central Fire Alarm Office is, essentially, the main fire communications center in which alarms are received and dispatches made.

California Disaster Office (CDO): The office in the State of California having state level responsibility for civil defense.

Division Chief: (See Section 3.3) The top official of one of a number of Divisions within the California Disaster Office (CDO).

Emergency Operating Center: Focal point for coordinated actions by appropriate government officials during peacetime or wartime disaster. Emergency operating centers at each level, local, state and federal have been organized.

Fire College: In San Francisco, the Fire College is the place in which firemen are trained.

Warden: Persons designated throughout sections of the city to assist in civil defense emergencies. In some instances a warden may be assigned in each block of the city.

Fire District: In the state of California a fire district is a geographical area containing a number of communities which have mutually agreed to organize and maintain a firefighting capability for the service of all communities within the district.

## SECTION 1

### INTRODUCTION

#### 1.1 THE PROBLEM

The Office of Civil Defense (OCD) is sponsoring a number of studies relating to nuclear-weapon thermal effects and subsequent fire problems following nuclear attack upon cities in the United States. The need for effective postattack firefighting operations is readily evident. Thus, OCD has established a requirement for a better definition of the fire information needed during the transattack and postattack phase of nuclear war. This type of information is essential to the development of comprehensive preattack civil defense plans for assuring effective survival operations in the event of nuclear attack.

#### 1.2 SCOPE AND OBJECTIVES\*

The objective of this study is to determine the fire information required by the CD command-and-control organization to enable CD planning and operations to be effective. The work will include but not limited to:

1. Identifying CD system elements, local through national, where fire and fire effects must be considered in planning and operations.
2. Identifying and quantitatively defining the fire information required in terms of content, context, frequency, form, accuracy, etc. Emphasis in this study will be on the needs of Emergency Operating Centers. The study will examine localities specified by OCD.

#### 1.3 BACKGROUND

In the explosion of a nuclear weapon, a vast amount of energy is released in a very short time. This energy is in the form of blast, nuclear radiation and thermal radiation (heat). Under normal circumstances, this intense heat is capable of igniting exposed combustible materials over distances on the order of miles. As a result, numerous fires are expected immediately following a nuclear attack. These fires

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\* Content for this subsection is quoted directly from the OCD Research Task Order.

will threaten the lives of many people who have survived the initial effects of blast, thermal and nuclear radiation from the detonation. In addition, destruction and severe damage to property from fires are anticipated. OCD, with the objectives of assisting state and local governments in planning for the protection of lives and property in the event of nuclear attack, is concerned with various aspects of the fire problem.

Primary objectives of a civil defense program are the protection of lives and property and the maintenance or restoration of essential services and facilities within a political jurisdiction during emergencies arising from attack or natural disaster. On the national and regional levels, civil defense is mainly concerned with the possibility of nuclear attack upon the country; state and local civil defense programs include preparation for natural disaster as well.

#### 1.4 APPROACH

Initially, existing and proposed civil defense policy, plans, procedures, organization and facilities were analyzed. This analysis was conducted to determine the various elements of the civil defense organization, their respective roles and responsibilities, and how each might require fire and fire-effects information. Civil defense and fire-control operations were examined for several cities and states within three of the seven OCD Regions (see OCD Regional map in Section 2). Two significant observations were noted: (1) that political jurisdictions differ in local conditions and resources and in civil defense organization and procedures, and (2) in most instances, the fire and rescue sections of many city emergency operating plans simply call for "performing emergency fire-control measures as directed by the Civil Defense Director." Civil defense directors and fire chiefs found it difficult or impossible to speak about operations and fire information requirements without a specific attack example. For this reason, a specific attack and a specific city are selected for detailed examination in this study.

This approach was considered essential, since without consideration of detailed operations: (1) procedures and specific responsibilities could not be identified; (2) problem areas arising in controlling fires could not be assessed; (3) coordinative functions could not be explored; and (4) information requirements to permit definite decisions and courses of action could not be determined.

As noted below, care was taken to select a "scenario" which permitted generalization of conclusions and recommendations. It is considered that this was successfully accomplished. To the extent that information requirements can in fact be assessed on a broad scale (as opposed to a detailed case-by-case approach) the attack/city defined for the purpose

of the present study is considered near optimal in that it: (1) involved a region where detailed information was immediately available to the investigator; (2) used an attack which will be the subject of other investigations in the Five-City-Study program; (3) maximized the fire problems (and the fire-information requirements); (4) treated a city with experience in large-scale fires and which possessed an unusually complete state of planning and training and (5) permitted the realism required to meet the objectives of the study.

Specifically, steps taken in accomplishing this study were as follows:

1. Identify and characterize pertinent civil defense operations planned for the transattack and early postattack situation relating to fire control.
2. Identify the elements of civil defense requiring fire and fire-effects information following nuclear attack.

Experience with natural-disaster situations has shown the value of an effective command-and-control organization capable of directing emergency operations. This experience has led to the concept of an Emergency Operating Center (EOC) for civil defense at Federal, state, and local levels. The concept, purpose, and organization of the EOC are described in detail in Section 3.1. In the present study, primary emphasis is accordingly placed on defining the information relative to fire and fire-effects that is needed by EOC fire officials. This emphasis is applied as a result of a study of the specific missions of various OCD levels and organizations in the event of a nuclear attack (Section 2); it is the local EOC which will be most intimately involved with fire-control operations.

3. Select a specific city and a representative attack pattern within the framework of the one of the Five City Study Attack patterns to permit detailed evaluation of fire effects, operations, and information requirements. In cases where fallout and blast effects are extreme, fire information is relatively useless, since little can be done to combat the associated fires. Conversely, maximum fire information will be needed when thermal effects are severe, but blast and fallout effects are minimal. Thus the criterion of selection used was to find a city and attack in which expected fires would be significant, but blast and fallout relatively insignificant. Nuclear weapon effects resulting from the attack situations in Ref. 2 in the OCD-selected "Five Cities" (Providence, Albuquerque, New Orleans, Detroit, and San Jose) were sufficiently high that the criterion for maximum fire-information requirements for this study could not be satisfied in any of these cities. It was noted that bursts listed in Attack Pattern #1 for weapons detonated over Moffett Field (35 miles

from San Francisco) and Richmond, California (about 8 miles from San Francisco) would produce a condition in San Francisco in which blast is moderate to slight, fallout is negligible and fire problems are severe over a 4-square-mile area of the northeastern sector of the city. Moreover, in her history, San Francisco has burned to the ground several times and is, even today, a city extremely vulnerable to catastrophe by fire,\* be it from earthquake or other cause. Thus San Francisco was selected as the city of interest and Attack Pattern No. 1, published in the OCD Guide for Participants, Five City Study,<sup>2</sup> was selected as the hypothetical attack.

4. Determine weapon effects in San Francisco resulting from two bursts selected.

5. Determine preattack posture of civil defense and the local population.

6. Determine postdetonation fire situation (expected location of initial fires).

7. Determine firefighting strategy for the given situation.

8. Evaluate firefighting operations and EOC procedures.

9. Determine fire information needed by the EOC, at the local level and at higher echelons of civil defense.

Since in any study which attempts to develop information requirements, emphasis must be placed on defining the kinds of decisions which are to be based on such information. The decision process in fire control has been examined in detail. (See, for example, Section 6). Although other aspects of civil defense (e.g. rescue of casualties, evacuation of personnel, etc.) could certainly affect the fire control operation the main impact would be on the degree of firefighting effort possible, thus such operations would not significantly affect the kinds of information needed. This little detailed attention has been allocated to these types of concomitant operations.

## 1.5 PLAN OF REPORT

The elements of the civil defense organization requiring fire information are identified in Section 2.3. Civil defense on the local level is

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\* Personal communication, William F. Murray, Chief, San Francisco Fire Department.

the agency primarily concerned with fire planning and operations immediately following nuclear attack. Higher echelons of civil defense will be concerned with fire effects in the postattack recovery phase (see Section 6.6).

Emergency Operating Centers (EOC's) are described in Section 3.1. Refinement of EOC's varies from city to city, but the concept of consolidated government representation for coordinated decision-making in time of disaster is virtually the same for all political jurisdictions. Section 3 also discusses readiness conditions, mutual aid and military assistance.

A typical command-and-control situation following a hypothetical attack on the United States is described in Section 4.

Fire information required for postattack firefighting operations has been discussed in detail in Section 6. Fire information needed for other emergency operations is also discussed in Sections 5, 6, and 7. Data for Section 6 have been gathered primarily from the San Francisco, Calif., Fire Department; however, every effort has been made to state the fire information in such a way that form and content can be applied in general terms to any city in the United States.



## SECTION 2

### CIVIL DEFENSE ORGANIZATIONAL ELEMENTS

#### 2.1 ORGANIZATION OF CIVIL DEFENSE IN THE UNITED STATES

Civil defense is organized in the United States on the Federal, state and local levels in a manner parallel to the organization of our basic government structure. Specific responsibilities and authority exist at each level as opposed to the chain-of-command type of operation.

##### 2.1.1 Federal Level

On the Federal level, responsibility for civil defense rests in the Office of Civil Defense (OCD), which is under the Secretary of the Army, Department of Defense. Headquarters for OCD are in the Pentagon, Washington, D.C., with seven OCD Regional\* Offices distributed throughout the United States. The Regional boundaries, shown on the map in Fig. 1, are based on geographical divisions of the United States.

##### 2.1.2 State Level

Each state has a civil defense agency serving the Governor of the state. In California, the state civil defense agency is the California Disaster Office (CDO) which reports directly to the Governor. In other states, the civil defense agency is an office within the Department of Public Safety or some other state department. Frequently, states are further subdivided into areas, each comprising several counties and having a civil defense area Headquarters Coordinator.

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\* In this report, for clarity, OCD Regions are capitalized and state regions (see Section 3.1.4) are not.

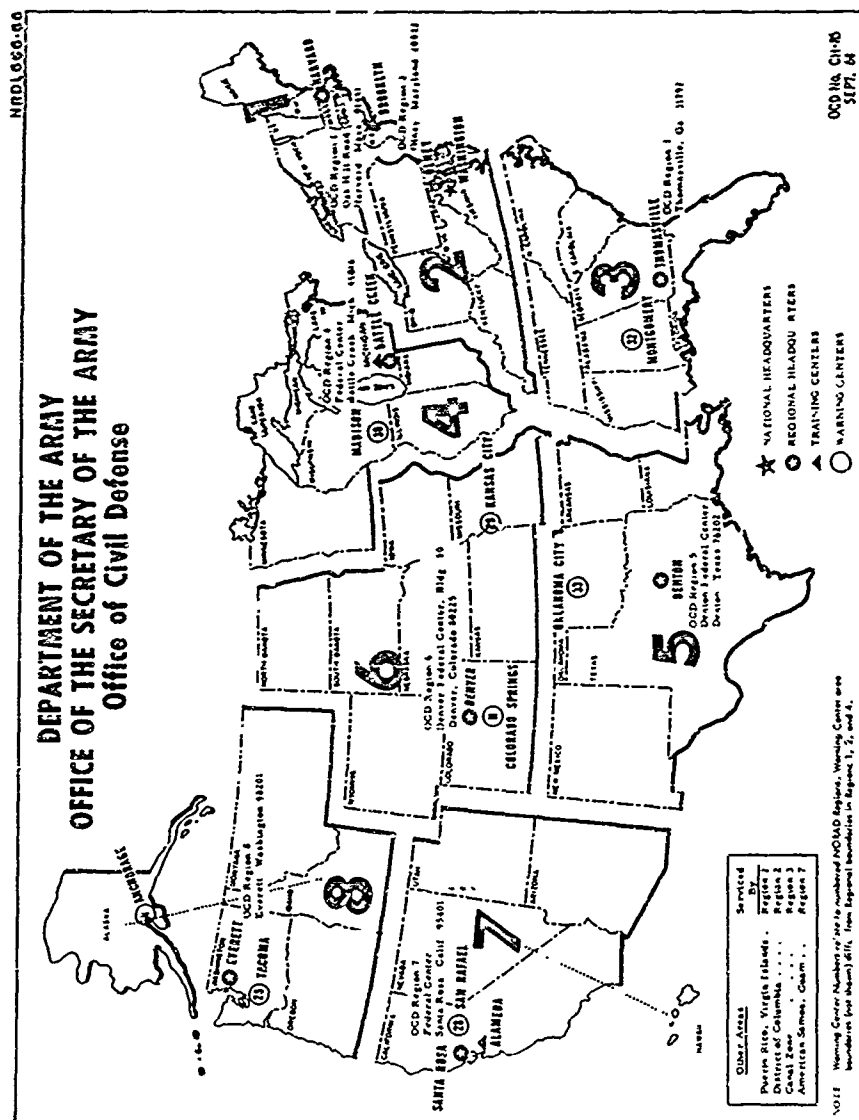


Fig. 1 OCD Regional Boundaries and Field Installations

### 2.1.3 Local Level

On the local level, cities and/or counties within the state appoint civil defense directors who report to the highest chief of government of the specific area. Such men may be called "Civil Defense Directors" or may have a different title. For example, in San Francisco, the title is Commander, San Francisco Disaster Corps, and the director reports to the mayor. Since at all levels, civil defense is largely a coordinative function, the civil defense directorship is largely a staff position; the actual emergency effort after an attack will be, in practice, carried out by the regularly constituted authority of a locality. In the city of San Francisco, the mayor is the highest official of the city government and he will be the official Commander-in-Chief of the city in a disaster. The Commander, San Francisco Disaster Corps will be the mayor's Chief of Staff. The mayor may delegate various duties to his Chief of Staff, many of which, in turn, may be delegated to the appropriate emergency civil defense departments such as the Fire Department, the Police Department, etc. Overall responsibility, however, remains with the mayor.

## 2.2 GENERAL RESPONSIBILITIES FOR CIVIL DEFENSE ELEMENTS

General responsibilities for Federal, state, and local level civil defense are delineated in the Federal Civil Defense Guide, Part A, Chapter 2, of January 1965 and are essentially quoted from that source in the following subsections.<sup>3</sup>

### 2.2.1 Federal Level

#### 2.2.1.1 Office of Civil Defense

1. Formulate and develop the Civil Defense Program and provide guidance for implementation of each subprogram at each level of government.
2. Establish civil defense policies, programs, and doctrine covering emergency operations.
3. Report to and inform the Congress through the Secretary of the Army.
4. Develop technical information and disseminate guidance materials on civil defense to government officials, industry, business, professional organizations, civic groups, and the public. Conduct training programs for the instruction of civil defense officials and other persons in the organization, operation, and techniques of civil defense.

5. Coordinate civil defense activities of the Federal departments and agencies.

6. Maintain liaison and coordination with NATO on civil defense matters.

7. Disseminate information to the public, and emergency public information and instruction as appropriate.

8. Maintain program contact with state and local governments through the OCD Regions. (Note: Many of the responsibilities listed under OCD national headquarters throughout this document are, in fact, implemented by the OCD Regions.)

9. Insure that all civil defense program activities initiated by OCD national headquarters, OCD Regions, other Federal agencies, or private business firms under contract, but which are to be accomplished within a given state, are coordinated with the state civil defense agency prior to implementation.

#### 2.2.1.2 Other Federal Agencies

1. Each Federal department and agency:

- a. Develops civil defense plans for use of its personnel, materials, and services in aid of the states during a civil defense emergency (Federal Civil Def. Guide, part B, Chap. 1, App. 7).<sup>4</sup>
- b. Makes available its personnel to the states for training purposes (FCDG, Part B, Chap. 1, App. 8).
- c. Performs civil defense functions assigned to it in emergency preparedness Executive Orders, in consonance with national plans, programs, and operations of the Department of Defense. (FCDG, Part B, Chap. 1. The full text of the applicable Executive Orders is contained in Part B, Chap. 1, Apps. 9 through 26.)

2. Secretary of Agriculture -- Conduct the food stockpile program (FCDG, Part B, Chap. 1, App. 6).

3. Secretary of Health, Education, and Welfare -- Conduct the medical stockpile program (FCDG, Part B, Chap. 1, App. 6).

2.2.1.3 OCD Regions. Implement the policies and programs of OCD, and conduct and monitor the Civil Defense Program at the Federal Regional Level. This includes:

1. Coordination of state civil defense programs and activities.
2. Coordination of civil defense activities of the Federal field establishments.
3. Provision of technical advice, guidance and assistance on civil defense matters to representatives of the Federal field establishments and state and local governments.
4. Establishment and direction of the activities of the Regional Civil Defense Coordinating Boards (RCDCB) and maintenance of liaison with the participating agencies.
5. Peacetime operation of OCD systems at Regional level.
5. Establishment of an appropriate emergency Regional civil defense organization, including provision for liaison with Zone of the Interior Armies.
7. Explain, interpret, and disseminate OCD policies, programs, and instructions.
8. Disseminate information to the public, and emergency information and instructions as appropriate.

2.2.2 State and Local Governments

1. Conduct programs to achieve civil defense readiness.
2. Carry out civil defense subprograms in accordance with Federal government policies and program guidance, consistent with state law.
3. Develop plans and procedures to execute Federal emergency assignments, as required.
4. Establish civil defense agencies and conduct appropriate instruction.
5. Disseminate information to the public and emergency information and instructions as appropriate.

Responsibilities and procedures for postattack operations, particularly as exemplified by California, are discussed in Section 3.

## 2.3 CIVIL DEFENSE ELEMENTS REQUIRING FIRE INFORMATION

### 2.3.1 Relative Requirements at Federal, Regional State, and Local Levels

From the statements of missions and responsibilities presented in Section 2.2, it is apparent that the primary effect of operations carried out by Federal, Regional, and even State levels must be applied in the preattack planning phase, or in a broad coordinate manner in the late postattack phase. The problem of coping with the emergency phases of nuclear attack (or other national disasters) is left to the local organizations. These responsibilities, facilities, and operations are considered in greater detail in Section 3.

For a variety of reasons, this is the best approach to any effective transattack and early postattack operational planning. The implication of such an approach to the present report is that it is the local levels which will require fire information (since they are intimately involved), rather than the higher levels (since they are not).

### 2.3.2 Agencies Needing Transattack Fire Information

As will be shown later, the primary element of civil defense operations requiring transattack fire information is the fire department of the municipality in which fires develop following nuclear attack. Other elements of civil defense (police, Health and Welfare, Red Cross, etc.) may use information about local fire conditions in performing their respective emergency functions.

If the state-level civil defense organization can assist communities in controlling fires by supplying resources for firefighting, then the resource requirements of such communities become essential fire information. (For reasons which will be stated later, this condition is considered unlikely.) There is no apparent requirement for transattack fire information by Federal-level EOC's. OCD Regional Emergency Operating Centers and, ultimately, OCD Headquarters will have an interest in nuclear-radiation intensities, total physical damage (no matter how caused blast, fire, etc.) that hampers movements or destroys shelter, numbers of survivors, numbers of casualties and population movements, but not specifically fire information.

### 2.3.3 Agencies Needing Postattack Fire Information

After fires in cities are extinguished, the fire information required by civil defense elements will be essentially contained in

reports of damage surveys. The local levels will be concerned with more detailed data than the state will require, while the Federal level will be interested in much broader damage information. Presumably, whether the damage sustained was due to blast or due to fire will be immaterial at the Federal level, Regional, and probably even the State levels.

## SECTION 3

### CIVIL DEFENSE COMMAND-AND-CONTROL FACILITIES AND OPERATIONS

#### 3.1 EMERGENCY OPERATING CENTERS (EOC's)

Section 2 discussed generally the organization, responsibilities and requirements for fire information at the Federal, state and local levels. Since state and local areas vary in size, population, wealth, and organizational structure, it is necessary to use specific examples in the discussion of facilities and operational plans required to implement civil-defense planning. In this section, the background and purpose of Regional EOC's are discussed in general terms, but the state and local levels are discussed in relation to California and San Francisco respectively. Other states and areas would be more or less similar.

##### 3.1.1 Background and Purpose - General

Experience with natural disaster situations has shown the value of an effective command-and-control organization capable of directing emergency operations. This experience has led to the concept of an Emergency Operating Center (EOC) for civil defense at Federal, state and local levels.

In case of an attack, an EOC is intended to provide a protected facility for officials at the different levels of government to perform command-and-control functions associated with the essential phases of government (law enforcement, fire, public works, etc.). During peacetime, space and facilities in an EOC may be used for conducting many of these same functions on a routine basis. General functions for an EOC are outlined in the OCD Professional Guide Series PG-80-7, Emergency Operating Procedures, of January 1964.<sup>1</sup> In brief they are:

1. Direction of all emergency operations of the political jurisdiction.
2. Communications and warning.



3. Consolidation of damage-assessment data and forwarding of requirements for survival items for inclusion in Regional and National supply-demand considerations.

4. Allocation and distribution of survival items to local authorities.

5. Consolidation of information and coordination of requirements for survival actions.

6. Performance of the essential elements for normal preattack functions of government; e.g., police, firefighting, water purification and supply, and sanitation.

7. Provision of emergency information and instructions to the public.

8. Collection and collation of radiation readings, radiation monitoring and decontamination.

9. Direction and control of shelter occupancy, exits from shelter, intershelter movement, and assistance and emergence from shelter.

10. Maintenance of contact with other Emergency Operating Centers and coordination of civil defense activity within a political jurisdiction.

At present only one completed protected Regional-level EOC is fully operational. This EOC is for OCD Region 5 and is located in Denton, Texas. The other six OCD Regions have interim EOC facilities. A total of 2,585 EOC's are planned for states and municipalities throughout the United States. Of this total, about 2,000 EOC's are completed and operational and more than 500 EOC's are under construction.\* These figures refer only to construction or adaptation and designation of specific structures as EOC's and of course do not imply that political jurisdictions without edifices so labeled are therefore unprepared. In assuming readiness for nuclear attack or other disasters, it is important that there be a responsible and capable body (1) to preserve law and order and (2) to provide direction and control for the protection of life and property in a time of crisis. Regardless of the housing or facilities, to accomplish command and control during an emergency, it is necessary to obtain intelligible, accurate information by some means. This information must be analyzed, sound decisions made, and orders issued. This can be accomplished through suitable planning and organization whether or not the element involved is called an EOC.

\* Personal communication, Mr. Harold Tepper, Chief, Emergency Operating Centers Branch, OCD, 30 June 1966.

Thus in this study, we are concerned with defining the information relative to fire and fire effects that is needed by the EOC, or whatever element fulfills the function of an EOC.

### 3.1.2 California State Emergency Operating Center

Since large forest fires occur annually in the State of California, the state has been divided into six geographic regions,\* which in turn, are divided into operational areas to facilitate over-all fire management. Generally, the boundaries for the operational areas coincide with county boundaries. These (state) regional boundaries are shown in Fig. 2. The Fire Service operations chart (Fig. 3) shows coordination and support lines in effect during nuclear attack.

The organization of the state Fire Service consists of the following:

1. All regularly organized municipal fire departments, fire districts, state and county-wide fire agencies, Federal forestry and park-service fire agencies, and legally organized privately-owned fire departments. During a state of extreme emergency such as a nuclear attack, these agencies become a part of the California Disaster Office (CDO).

2. The Chief, Public Safety Division,\*\* Fire and Rescue Section, who is the state fire coordinator on the staff of the Director of the California Disaster Office.

3. Regional fire coordinators and their alternates who are selected by the area fire coordinators within their respective regions and serve on the staff of the regional coordinator of their respective regions during a state of disaster or a state of extreme emergency, as declared by the Governor.

4. The area fire coordinators and their alternates who are selected by the Fire Chiefs of the area and serve on the staff of the operational area coordinator of their respective areas.\*\*\*

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\* In this report Federal OCD Regions are capitalized and state regions are not.

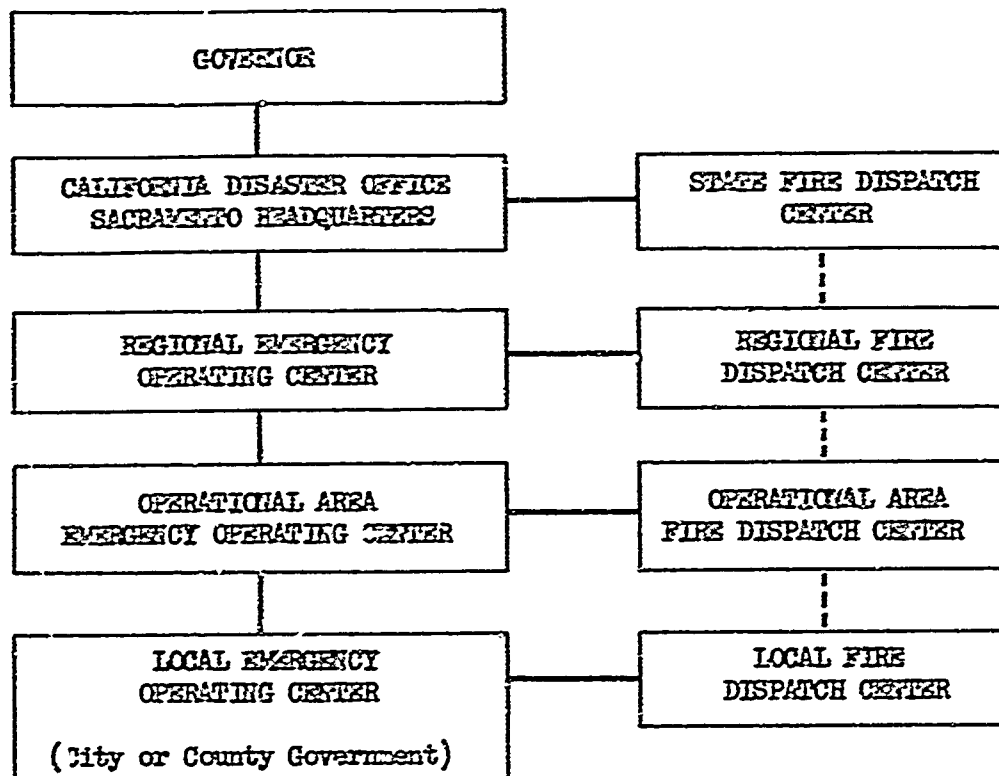
\*\* The Public Safety Division is a Division of CDO.

\*\*\* Items 1-4 are derived from "Fire and Rescue Service," State Fire Disaster Plan (Ref. 5).



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Fig. 2 California State Regional Divisions



———— Line of overall coordination and support.

----- Line of coordination of fire operations and technical assistance.

Local officials are responsible for the conduct of operations within their geographical boundaries.

During a State of Disaster declared by the Governor, the Fire Service will be represented at emergency operating centers when requested by the appropriate Civil Defense Coordinator.

During a State of Extreme Emergency the Fire Service shall be represented at each emergency operating center.

Fig. 3 California Fire-Service Operations Chart

Requests for assistance (mutual aid) must be made by the local Fire Chief, or his duly authorized representative, to the area Fire Dispatch Center for action. Each center is required to be carefully selected and fully equipped for emergency operations. Further center requirements include 24-hour daily operations, and facilities permitting direct communications with fire departments and fire districts\* within the area. The center must be staffed with competent personnel and equipped with maps, charts, records, and operational data necessary for effective operation. The State Fire and Rescue Service Plan<sup>5</sup> further recommends establishment of Alternate Centers.

The area Fire Chief at an area Fire Dispatch Center receives a call for assistance, evaluates the request, and then determines which community should respond in accordance with mutual aid plans. Dispatch instructions are issued.

If an area fire coordinator needs assistance, requests are made to the regional fire coordinator or dispatcher, who follows the same system as an area fire coordinator. If two or more regions are affected by disaster (highly probable following nuclear attack), the state fire coordinator would receive mutual-aid requests from the regional coordinator.

In the attack considered, requests for assistance would be made by the civil defense director\*\* at the EOC in San Francisco to the regional coordinator in the EOC for region No. 2 at Yountville, California. Alternate planning provides for making the request directly to the State Fire Marshall's Office, California Disaster Office, Sacramento. However, within the framework of the attack postulated in this study, Sacramento was the target for a 5 megaton surface detonation, 4 minutes before the Richmond explosion, and it is doubtful whether any substantial mutual aid would be available in other possible attacks.

### 3.1.3 San Francisco City-County EOC

The San Francisco EOC is currently located in the basement of the Youth Guidance Center near Twin Peaks (see Fig. 7). The facility is equipped with direct underground telephone lines to all essential city government offices. Each phone line has a different exchange so that if

\* In some sections of the state, citizens of several communities have organized cooperative fire-fighting groups under the name "fire districts."

\*\* The civil defense director of San Francisco is also the Operational Area Chief.

one or more exchanges are destroyed, EOC personnel will not be without telephone service. Desks for representatives of essential agencies are set up in the main office area. Agencies include:

1. Coordinator, Operational Area 7 (State-defined geographic area).
2. Commander, San Francisco Disaster Corps (as of the preparation of this report Mr. J. W. Conroy is both Operational Area 7 Coordinator and S.F. Disaster Corps Commander).
3. Traffic Control Police - Law.
4. Engineering - Public Works.
5. Welfare and Red Cross.
6. Transportation - Evacuation.
7. Communications (Pacific Telephone and Telegraph).
8. Utilities (Department of Electricity and the Pacific Gas and Electric Co.).
9. Medical.
10. Casualty Care (Rescue and First-Aid).

Adjacent to the EOC main office area, there are desk positions for:

1. Mayor and secretarial staff.
2. Water Department.
3. Supply, Purchasing, and Procurement.
4. Operational Information Officer.
5. Military Liaison.
6. RADEF\*
7. Legal - Attorney.

\* Radiological Defense.

On the front wall in the main office area, there is a large city map overlaid with celluloid. The map is in full view of all EOC personnel and will be used for plotting data relative to blast, fire, radiological effects, and other pertinent information. On the map, locations for the following services are identified:

1. Fire Department Division Headquarters.
2. Fire Department Battalion Headquarters.
3. Fire Stations.
4. Central Fire Alarm Office (described in Section 6).
5. Hall of Justice (which contains the main communication center for the San Francisco Police Department, also the peacetime office for the San Francisco Disaster Corps).
6. Police Stations.
7. Health Building.
8. Hospitals.
9. Emergency Hospitals.
10. Casualty Stations.
11. Rescue Stations.
12. Telephone Exchange Buildings.
13. Warden Headquarters.
14. Welfare Centers.
15. Master Control Center (local San Francisco designation for the EOC).
16. Air Raid Warning Sirens.

The EOC Communications Center at the Youth Guidance Center contains:

1. Fire Department receiver and transmitter (Fire Department has 2 channels).
2. Police (4 channels).

3. RACES\* transmitter and receiver covering all shortwave bands.
4. State Civil Defense Band.
5. Two magneto phones (battery operated) providing direct communication with the Central Radio Station at Christmas Tree Point.
6. State teletype net.
7. Direct teletype to Christmas Tree Point.

It is noted that the San Francisco EOC is representative of the average level of size and complexity for areas of comparable size.

Local planning calls for the construction of a new EOC in the basement of the Red Cross building (see Fig. 7). The EOC at the Youth Guidance Center will be closed after the new EOC is completed.

#### 3.1.4 Alternate EOC's - San Francisco

The Central Radio Station at Christmas Tree Point on the southeastern slope of one of the Twin Peaks (see Fig. 7) is designated as the alternate EOC and is operated by the Department of Electricity, City and County of San Francisco. Station facilities are entirely below ground and routinely operate 24 hours daily. Positions for Fire, Police and Water Departments are set up. If the primary EOC in the Youth Guidance Center or the new EOC facility in the Red Cross Building is destroyed or inoperable in time of emergency, the Central Radio Station can serve EOC functions. Both the EOC and the Central Radio Station have gasoline-driven, emergency auxiliary generators so that radio communications can be maintained if normal power is disrupted.

### 3.2 CALIFORNIA READINESS-CONDITION DEFINITIONS AND PRESCRIBED ACTIONS

Four readiness conditions based on the magnitude of international tensions have been defined in the State of California Civil Defense and Disaster Plan, Part II, Attachment A, Page 1-2.<sup>6</sup> These conditions are defined as follows:

#### A. Condition Four

This condition is in effect during the normal peacetime situation under which there appears to be no immediate threat of a war emergency,

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\* RACES is the abbreviation for Radio Amateur Civil Emergency System.



and civil defense organizations are concerned primarily with the development of the operations readiness program, including a program to cope with natural disaster. State and local governments operate in a normal manner, giving first priority to their peacetime statutory responsibilities and obligations.

All agencies should conduct emergency planning and training consistent with their emergency responsibilities.

**B. Condition Three**

This condition will be announced by the Governor, or his representative, when in his opinion it would be prudent to assume a status of increased readiness in government, but will not involve the formal "alerting" of the general public.

**C. Condition Two**

This condition will be announced by the Governor, or his representative, when in his opinion the emergency organizations of state and local governments and the public should take additional specific precautionary measures in preparation for a war emergency. Condition Two is indicated by an international situation created by actions on the part of a potential enemy, or United States reactions, which by their nature appear to contain great risk of general war.

**D. Condition One**

This condition will be announced by the Governor, or his representative, when in his opinion it would be prudent to assume a complete state of readiness for an impending war emergency. Condition One would be based on official advice from the Federal Government. This advice could come in the form of Strategic Warning that general war appears inevitable. Under this condition the Governor will proclaim a "state of extreme emergency" to permit the full mobilization of emergency staffs and to make the transition to a wartime footing prior to the outbreak of hostilities, which could occur with little or no warning.

### 3.3 GENERAL PRESCRIBED ACTIONS -- CDO, STATE AGENCIES AND LOCAL GOVERNMENTS\*

#### A. California Disaster Office (CDO)

1. Carries out CDO statutory responsibilities in accordance with state laws and Federal programs,\*\* giving priority to improving operational readiness at state and local government levels.

2. Maintains 24-hour Attack-Warning Duty Watch at CDO Headquarters during peacetime and maintains State Emergency Headquarters No. 1 and 2 and the six regional EOC's on a standby basis.

#### B. State Agencies

Improve and revise as necessary on a continuing basis their plans for actions to be taken under Readiness Conditions Three, Two, and One.

#### C. Local Governments

1. Improve emergency organizations.
2. Revise and update operational plans.
3. Participate in tests, exercises, and training courses.
4. Improve shelters and shelter plans.
5. Take any other feasible actions to improve operational readiness.

### PRESCRIBED ACTIONS -- CONDITION THREE

#### A. California Disaster Office

CDO actions will include but will not necessarily be limited to the following:

1. Any existing or planned leaves of absence for employees will be cancelled.

\* Information contained in Subsection 3.3 was based on Ref. 6.

\*\* See Ref. 6.

2. The personnel-alerting system will be checked.
3. All radio and landline communications systems will be checked for serviceability.
4. Regional administrators will be briefed and instructed by the Director or the Deputy Director.
5. Each Division Chief\* and Division Operations Coordinator of the CDO will examine his staff organization for a "State of Extreme Emergency" and make necessary preparations to operate as a component of the State of California Civil Defense Organization for a State of Extreme Emergency.
6. All divisional projects related directly to improving operational readiness will assume priority and, where possible, be rushed to completion.
7. Arrangements will be made to facilitate activation of State Emergency Headquarters No. 1 (Public Works Building in Sacramento), and State Emergency Headquarters No. 2 (Classified Location).
8. Each division will establish contact with those state agencies directly concerned in its area of responsibility and ascertain that agency-alerting procedures are current and ready to be implemented and determine, where applicable, any changes in the names of personnel to be assigned to State Emergency Headquarters No. 2 and regional staffs during a State of Extreme Emergency. Planning Division will initiate the action on this activity, effect the coordination necessary to its accomplishment, and report to the Director.
9. Additional Warning Control Officers will be appointed to provide 24-hour duty watch at State Emergency Headquarters No. 1 and No. 2.
10. CDO personnel complement, if understrength, will be brought to full authorized strength.
11. An Information Center will be established at CDO headquarters by the Education and Information Division to process and answer public inquiries.

\* For definition, refer to the Glossary p. ix.

12. Information releases will be made periodically (at least once daily) by the Education and Information Division; these releases will be directed to the heads of state agencies, the news media, and to regional administrators; regions will disseminate the releases to Operational Area coordinators for further transmittal to cities; the latter should in turn disseminate additional local information to their city officials and the local news media.

13. The Director or Deputy Director will brief the Governor and the Public Safety Agency Administrator on state government's operational readiness posture.

**B. State Agencies**

State agencies will make the necessary preparations for personnel and equipment alert procedures to be placed in effect in the event developments require an even greater readiness condition.

**C. Local Governments**

Local CD organizations should take as a minimum the following precautionary measures and any other actions deemed appropriate in their respective situations:

1. Cancel existing or planned staff leaves of absence.
2. Check public alerting and warning systems.
3. Arrange for checks of all special emergency equipment.
4. Check serviceability of existing communication systems and arrange for planned augmentation.
5. Brief local governmental officials and employees on the situation.
6. Examine staff organization for readiness to function.
7. Discontinue projects and programs that cannot be quickly completed, and place priority on activities to increase operational readiness.
8. Establish an information service capable of answering public inquiries.

9. Advise the public to continue most of their normal activities and, at the same time:

- a. Review personal and family survival plans.
- b. Assure the adequacy of onhand stocks of food, water, and other necessities.
- c. Keep informed of the developing situation and comply with all official directives issued by their respective local governments.

PREScribed ACTIONS -- CONDITION TWO

A. California Disaster Office - Sacramento

- 1. Increase after-working-hours staff to two (2) warning control officers at the Meadowview Road Attack Warning Center in Sacramento.
- 2. Place all other off-duty key employees on telephone contact alert.
- 3. Cancel any existing or planned leaves of absence for employees.
- 4. Notify CDO regions and DOD - OCD Region 7 at Santa Rosa, California of this status.
- 5. Activate cadre staff and communications equipment in State Emergency Headquarters No. 1 on 24-hour basis.
- 6. Activate 24-hour duty officer procedure, cadre staff and communications equipment in State Emergency Headquarters No. 2 (Classified Location).
- 7. Notify the Governor and the Administrator, Public Safety Agency, when the foregoing steps have been accomplished, and keep them informed of any information received from the Federal Government.
- 8. Continue or initiate periodic public information releases to state agencies, news media, and regions as provided under "Condition Three."
- 9. Dispatch available CDO headquarters technicians to the regions. as requested.

## **B. California Disaster Office -- Regions**

1. Commence 24-hour duty watch in the regional Emergency Operating Centers (EOC's), maintaining the ability to receive and disseminate information.

2. Issue standby alert instructions to emergency staff members to report or be ready to report to the EOC upon order or upon receipt of attack-warning information.

3. Notify Operational Area Coordinators of readiness status of the region and request coordinators to maintain 24-hour duty watch in their emergency centers.

## **C. State Agencies**

### **1. General Actions**

- a. Cancel leaves of key personnel who have emergency responsibilities.
- b. Issue standby alert instructions to personnel having emergency duties in the agency or the state civil defense organization staff at either of the two state emergency headquarters or any of the six regional headquarters.
- c. Issue instructions to be implemented at the onset of a state of extreme emergency for the temporary interruption of non-critical projects, programs, functions and activities which, by their postponement, will not adversely affect the emergency functioning of the state government, and order increased emphasis on those programs and projects that will favorably affect emergency operations of government.
- d. Safeguard essential documents and records.
- e. Transfer to their respective emergency headquarters or duty stations such files, statistics, records, forms, and other working materials as will be needed by the personnel at their assigned emergency stations, and not previously placed at said locations.
- f. State agencies having especially assigned emergency functions should make the necessary preparations to enable the full implementation of their emergency plans and standard operating procedures (SOP's).

## 2. Specific Actions

### a. Governor's Office -- Sacramento

- (1) Designated personnel will prepare to move on order to State Emergency Headquarters No. 1 (current SOP's for activating State Emergency Headquarters No. 1 are available).
- (2) Other personnel of the Governor's Office will prepare to take shelter in the basement of the Capitol if on duty; or, if off duty, will prepare to execute their personal survival plans.

Procedures here also been established for the Governor's return to Sacramento in case of absence, and for succession of the Office if he becomes a casualty.

### b. Disaster Control Board

- (1) Agency Administrators in Sacramento should make any necessary preparations to assure their emergency function in State Emergency Headquarters No. 1.
- (2) Agency Administrators absent from Sacramento when informed that "Readiness Condition Two" is in effect, should return to Sacramento by the most rapid means available. Upon return, the provisions of paragraph 2-b-(1) preceding should be followed.

### D. Local Governments

1. Place cadre staffs on 24-hour duty at EOC's and other control centers, keeping remainder of staffs on standby alert.
2. Take necessary action to assure public's accessibility to all shelters.
3. Keep the public informed and advised.
4. Continue or initiate, as appropriate, the actions prescribed for Readiness Condition Three.
5. Report operational status to next higher level of civil defense organization. The initial report should be made as soon as the above actions have been initiated and at 1200 and 2400 hours, thereafter.

### E. Continuity of Local Government

Individuals designated as alternates or standby successors to key local offices or positions should prepare to take shelter. Each person so designated should carry positive identification and proof of official status.

#### PRESCRIBED ACTIONS -- CONDITION ONE

##### A. State Agencies

Assume "state of extreme emergency" status and conduct operations in accordance with the provisions of their agency plans and the California Civil Defense and Disaster Plan.

##### B. California Disaster Office -- Sacramento

1. Disseminate information as it is received from the Federal Government.
2. Activate fully the State Emergency Headquarters No. 2 (Classified Location).
3. Designated personnel assume their assigned responsibilities in State Emergency Headquarters No. 1.

##### C. Regions, Operational Areas, and Local Governments

Become fully operational at EOC's and conduct operations in accordance with the provisions of the California Civil Defense and Disaster Plan and Civil Defense Operations Plans for local governments.

#### 3.4 MUTUAL AID

Mutual aid provides for the interchange of resources, facilities, and services between states and within states (between communities) during time of disaster. In OCD Region 7, continentally composed of California, Nevada, Arizona and Utah (Headquarters at Santa Rosa, California), there are formal agreements between these states to render aid under overwhelmingly perilous conditions. Within each of these states there are agreements between adjacent communities for the same interchange of assistance.

With respect to the control of fire, mutual aid has been invoked many times in the State of California. Members of the agreement include



all fire organizations within the state, cities, counties, fire districts, National Parks, U.S. Forest Service and the State Division of Forestry. On the state level, complete up-to-date card inventories are maintained on personnel and equipment assignments by city, county, region, and area. These cards indicate numbers of chiefs, deputy chiefs, location of dispatch stations, description and condition of fire equipment, part-time-full-time, volunteer and trained auxiliaries. When mutual aid for fire is requested, dispatchments are made to the fire scene. In addition, dispatchments of men and equipment are made to the area or areas furnishing mutual aid so that they are protected during their absence.

In addition to local and regional mutual aid, the Federal government provides assistance to states and communities in certain instances. If the Governor of a state in which disaster occurs considers that the situation warrants federal assistance, he may submit a request through channels (The Office of Emergency Planning). If necessary conditions are satisfied, the President of the United States may declare a "major disaster" making supplementary Federal assistance available to the distressed state. The State of California Master Mutual Aid Agreement is quoted in Appendix A.

### 3.5 MILITARY ASSISTANCE TO CIVIL DEFENSE

Policies providing military support to civil defense activities (both in peacetime and wartime) were approved by the Secretary of Defense in 1963. These policies are described in DOD Directive 3025.10.\* Detailed planning and agreements regarding the military-support concept are made between the State Adjutant General and the State Civil Defense Director to assure that military-support planning is compatible with state and local civil defense planning. Military support to civil defense is in no way intended to supplant or substitute state and local civil defense planning and operations. In fact, members of the military service have the primary responsibility to perform combat and combat-support missions in time of war. By agreement, only military personnel and equipment not committed to combat and combat-support missions will be available to assist civil defense.

Information pertaining to the general policy, for military support to civil authorities, civil defense responsibilities is discussed in the Federal Civil Defense Guide, Part G, Chapter 3 of April 1965, quoted in Appendix B of this report. Detailed policies and agreements for a particular state can be obtained from state Civil Defense Directors.

\* DOD Directive 3025.10, subject, Military Support of Civil Defense, dated 23 April 1963.

## SECTION 4

### COMMAND-AND-CONTROL SITUATION PRECEDING HYPOTHETICAL ENEMY ATTACK

#### 4.1 ATTACK CONSIDERATIONS\* ASSUMED BY FIVE-CITY-STUDY

##### 4.1.1 Escalation Period

The attack concept involves a large-scale nuclear exchange preceding which there is a  $3\frac{1}{2}$ -month period of increasing international tension. The "scenario" involves an uprising in East Germany, West German support of the uprising and subsequent Soviet and NATO involvement. In the beginning of the  $3\frac{1}{2}$ -month period before the strike on the United States, reports of the situation are covered routinely by the news services in the United States. The first significant news emphasis is placed on the border crossing by a West German battalion. Several subsequent events make "headlines."

When NATO forces enter the battle, the general public in the United States becomes increasingly apprehensive. Civil defense agencies throughout the United States begin disseminating instructions and information to the population from the time that the first nuclear weapon is used in Europe by the Soviet forces.

At the time of the attack on the United States the entire population has been warned and, in general, is very responsive to civil defense instructions.

##### 4.1.2 Attack Description

4.1.2.1 Overall. The hypothetical nuclear attack on the United States begins on a Wednesday in late August, at 0236Z (7:36 pm PDT, time 0 + 00 in Table 1) when the majority of the population throughout the United States is residually distributed. The attack continues for a period

\* Attack considerations discussed in Subsection 4.1 are, in part, based on information from the OCD Guide for Participants, Five City Study (Ref. 2).

of 72 consecutive hours. A total of 437 nuclear weapons are delivered and exploded. Yaak Air Force Station, Alaska, is the first target in the United States.

North American Air Defense Command (NORAD) may have a 15 to 45 minute indication of an attack before the actual detonation at Yaak. For the purposes of this study it is assumed that local civil defense directors throughout the United States will be simultaneously alerted fifteen minutes prior to the burst over Yaak.

**4.1.2.2 State and Local.** A total of 38 weapons is assumed to be detonated in the State of California, the first target being San Diego Naval Station. This explosion occurs 19 minutes after that over Yaak. Table 1 lists assumed target locations, weapon yields and times of burst for weapons exploded in or on the border of California. San Francisco is assumed not to be a target.

Explosions directly contributing to the fire problem in San Francisco are detonations 154 and 321 listed in Table 1. Detonation 154 is a 5-megaton airburst targeted on Moffett Field, California, which is exploded at 8:52 pm PDT. Blast overpressures ranging between 0.5 and 1.0 psi are experienced in San Francisco and are assumed to destroy most of the windows in buildings throughout the city.<sup>9</sup> This situation drastically increases the fire vulnerability of exposed structures.

Four hours and forty-two minutes later, at 1:36 am PDT, a 5-megaton surface burst occurs over the bay, southeast of the eastern terminus of the San Rafael-Richmond bridge, approximately eight statute miles northeast of San Francisco. Prevailing winds at the time of the Richmond burst are assumed to be north-by-northwest at five knots.

The effects of these weapons are discussed more fully in Section 5.

## **4.2 CITY POSTURE AT ATTACK TIME**

### **4.2.1 General Public**

Section 4.1 described the hypothetical escalation period in the United States together with a description of the postulated attack upon this country and on California targets. The discussion in 4.1.2 indicated that news services had kept the general public informed on the progression of events that culminated in a massive nuclear attack on U.S. military and civilian targets. Under these circumstances, the assumption can be

Table 1  
CALIFORNIA TARGETS, FIVE-CITY-STUDY ATTACK

<u>No.</u>	<u>Name</u>	<u>Yield (MT)</u>	<u>Time</u> <u>hr. + min.</u>
75	S Diego Navst	0.5 G*	0 + 19
94	Chico Afield	5 G	0 + 24
95	Deseret Depot	5 G	0 + 24
110	Mckinstry Lake	5 A	0 + 33
111	Browns Valley	5 A	0 + 34
112	Sutter Buttes	5 G	0 + 35
134	Roseville	5 A	0 + 57
135	Markleeville	5 A	0 + 58
149	Crows Landing	5 A	1 + 11
**154	Moffett Field	5 A	1 + 16
161	China Lake Na	5 A	1 + 23
162	China Lake Na	5 A	1 + 24
168	Vandenberg AFB	5 G	1 + 31
169	George AFB	5 A	1 + 32
170	Rodman Mnts	5 A	1 + 34
171	Edwards AFB	5 A	1 + 35
189	Long Beach Nu	5 A	1 + 53
190	Indio Hills	5 A	1 + 54
191	Douglas El Seg	5 A	1 + 56
192	Naval Constru	5 A	1 + 57
203	Los Alimitos	5 A	2 + 08
206	Imperial	5 A	2 + 12

\* In this table, "G" is used to denote a ground burst and "A" to denote an air burst.

\*\* These are the weapons affecting San Francisco in the example problem.

Table 1 (Cont.)

<u>No.</u>	<u>Name</u>	<u>Yield (MT)</u>	<u>Time</u> <u>hr. + min.</u>
207	Miramar Nas C	5 A	2 + 13
269	Castle	5 A	5 + 30
312	Stockton	10 G	5 + 54
313	Sacramento	5 G	5 + 54
320	El Paso	5 G	5 + 54
*321	Richmond Cal	5 G	5 + 58
323	Saranap	5 A	5 + 58
338	Union Oil Co	5 G	6 + 16
339	Parker Arizona	5 G	6 + 16
340	Los Angeles	5 G	6 + 16
346	Mather	5 A	6 + 35
351	Beale	5 A	8 + 05
354	Mare Is	5 G	8 + 37
361	George AB	1.5 G	10 + 20
416	El Toro Mcaf	1 G	41 + 10
418	Yuma Mcaas	0.5 A	43 + 23

\* These are the weapons affecting San Francisco in the example problem.

made that the attack is anticipated by the general public rather than a surprise. Assumed actions of the population include:

1. Most of the people have assembled survival supplies and made personal decisions regarding self-protection.
2. Some may decide to leave the city areas to stay with relatives or at vacation homes in the country.
3. Some may decide to make provisions for surviving the attack at home.

4. Another portion of the population find fallout shelters near their homes, offices, and other places frequented. Those who elect to stay in fallout shelters will probably have assembled in shelters before instructions to this effect have been issued by local civil defense authorities.

#### 4.2.2 Civil Defense Posture Prior to Attack

Both state and local civil defense will have accomplished the actions prescribed for Readiness Conditions Three and Two before the initial weapon is detonated on Yaak AFS.\* During Readiness Condition Two, the general public will be alerted. As Condition One approaches, backup staffs will be notified, key personnel (police, fire, public utilities, medical etc.) will be called to meet with the Civil Defense Director, all off-duty and fire reserves will be called to duty and the American Legion will be organized to provide assistance.

Fifteen minutes before the attack upon Yaak AFS, official strategic warning will be given to civil defense levels throughout the United States. Immediately thereafter, Readiness Condition One will be proclaimed, and all local, operational area, regional (state and Federal Regions) and State Emergency Operation Centers (EOC's) will become fully operational. Citizens will be advised to go to fallout shelters at this time (six hours, thirteen minutes before the explosion near Richmond, California).

Line-Load control, a means whereby telephone service is available only to authorized civil defense personnel, will be in effect during the late phase of Condition Two and through Condition One. (Civil Defense has provided a list of authorized names and numbers to the telephone company.) All other numbers will be inoperable. Staff physicians at hospitals will report to their hospital; all other physicians will report to the Health Department medical col.

Controlled response to fire alarms will be in effect. This means that, instead of dispatching 3 engines and 2 trucks to a fire alarm, only 1 engine and/or 1 truck will respond. Alternates to the Central Fire Alarm Office will be established. Specific personnel will be mobilized for preliminary emergency assignment, and all relief and auxiliary apparatus and equipment will be moved to an assembly area. (The present emergency assembly area designated in San Francisco is the Fire College at 19th and Folsom Streets.)

\* Refer to Subsection 3.2 for a definition of Readiness Conditions and Prescribed Actions.

## SECTION 5

### ATTACK EFFECTS ON SAN FRANCISCO

#### 5.1 CITY DESCRIPTION

San Francisco, California, is situated on the northern portion of a peninsula bounded on the west by the Pacific Ocean and on the north and east by the San Francisco Bay (see Fig. 4). Access from the north is by the Golden Gate Bridge; from the east, by the San Francisco-Oakland Bay Bridge and from the south by both oceanside and bayside highways. The city area is approximately 46 square miles with predominantly steep hilly terrain.

Census data (1960) shows the population of San Francisco to be 740,316. During the normal work week an additional 200,000 persons commute from outlying areas to jobs in the city of San Francisco. Approximately 46% of the commuters enter the city from the east via the San Francisco-Oakland Bay Bridge, 15% from the north via the Golden Gate Bridge and 39% from the southern portion of the peninsula.<sup>8</sup>

The climate is mild throughout the year, with temperatures rarely below freezing or above 90°F. The annual rainfall averages 20 to 21 inches, and occurs between November and April. Summers are cool, with fog frequently occurring in the early mornings and late afternoon, particularly in July. By late August (the time setting for the selected attack) the hot, dry season is under way. These two factors, together with prevailing wind conditions, significantly increase the fire hazard.

The percent of total ground area covered by buildings (builtupness) is in excess of 40%, with widespread use of woodframe construction. These two factors make San Francisco extremely vulnerable to mass fire following nuclear attack by both conflagration (moving fire front) and firestorm (stationary fire front).

San Francisco, however, has perhaps a unique advantage over other cities with respect to water supply. Figure 5 shows the San Francisco Water Department City Reservoirs and their capacities. In addition to the reservoirs shown in the figure, the San Francisco Fire Department has two reservoirs located at an elevation of 758 feet on Twin Peaks. Total reserve on Twin Peaks is normally 23 million gallons. Following

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COORDINATES  
170 17 17  
170 17 17

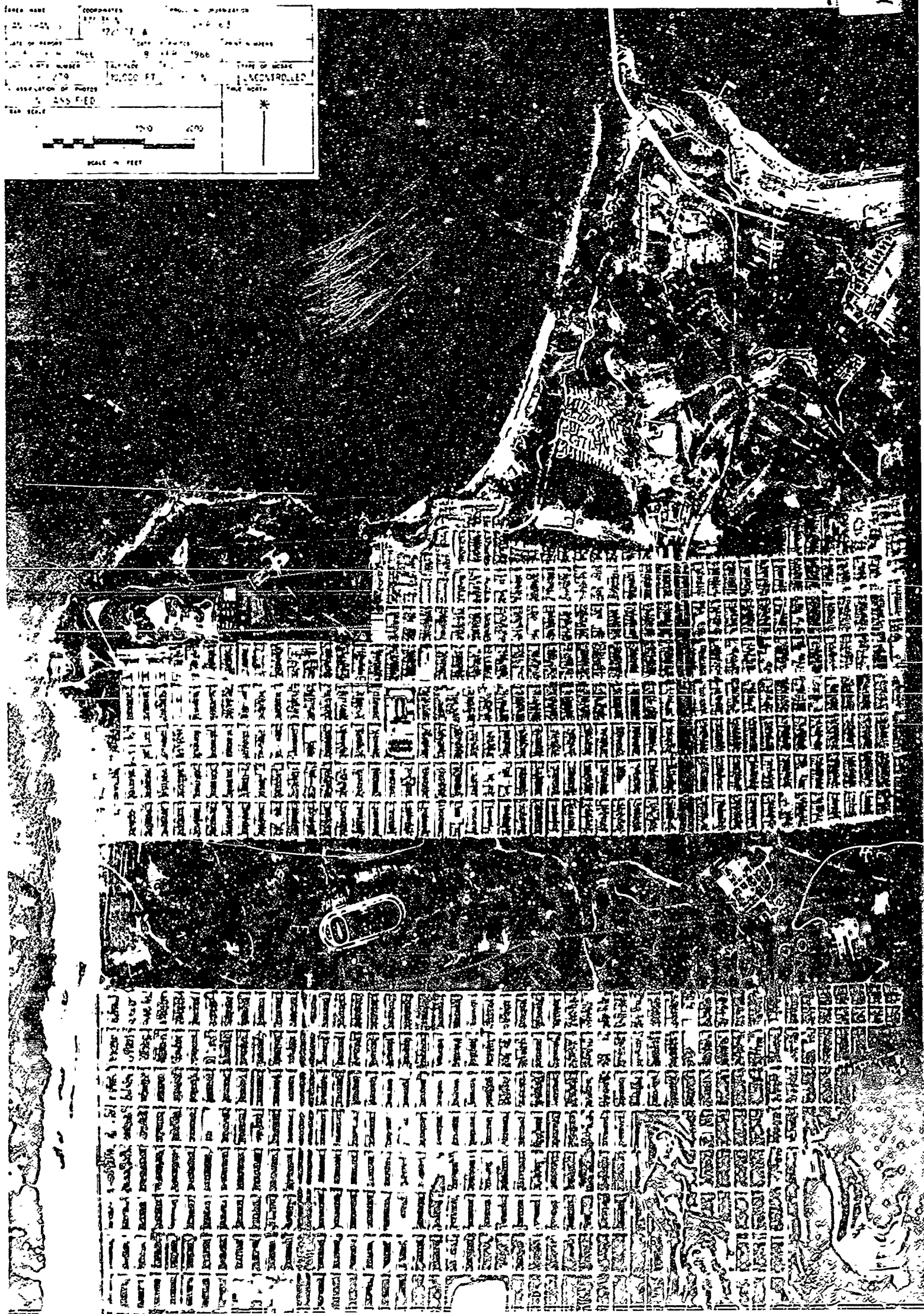
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DATE OF PHOTO  
1966

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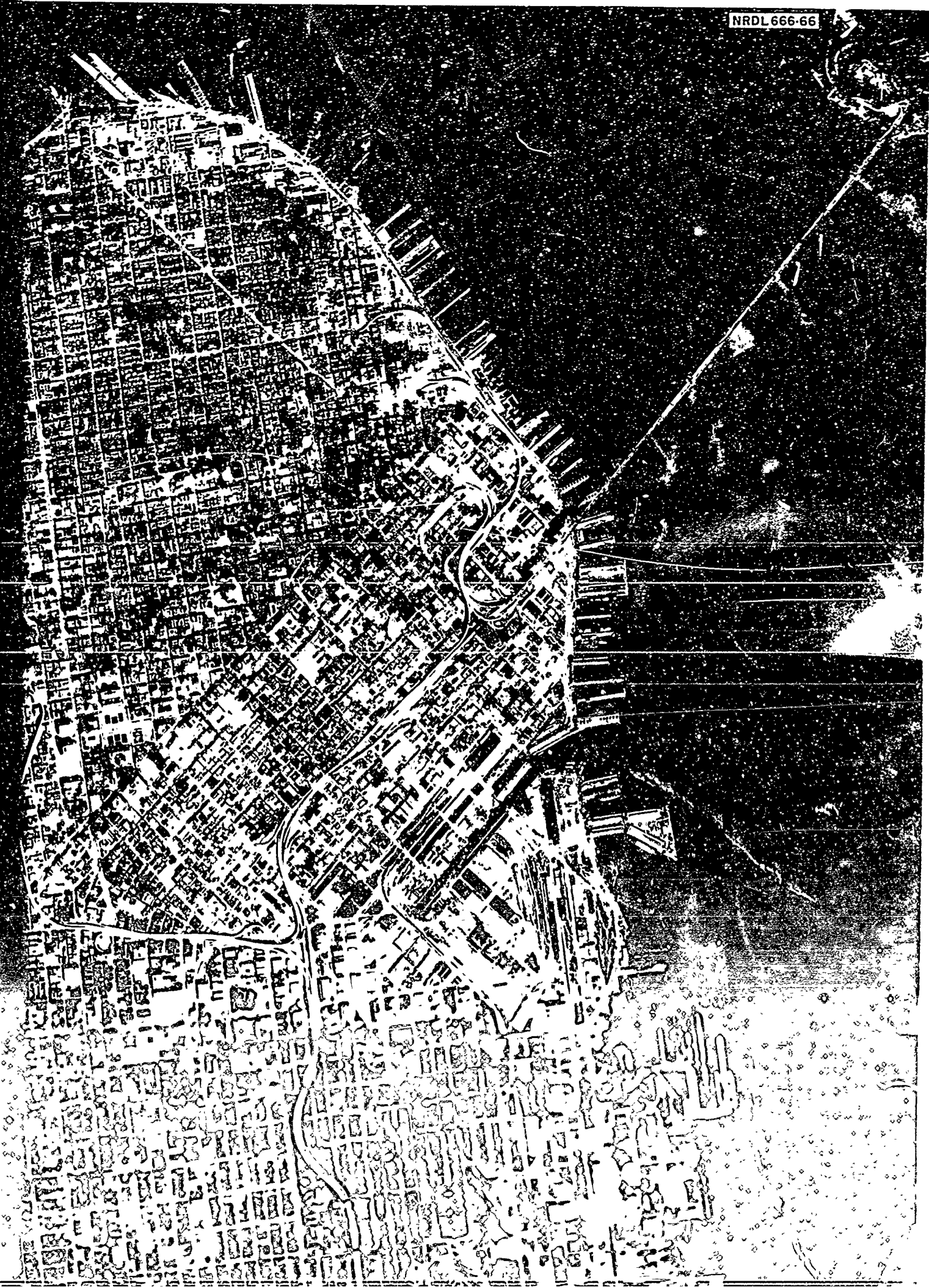
SCALE IN FEET

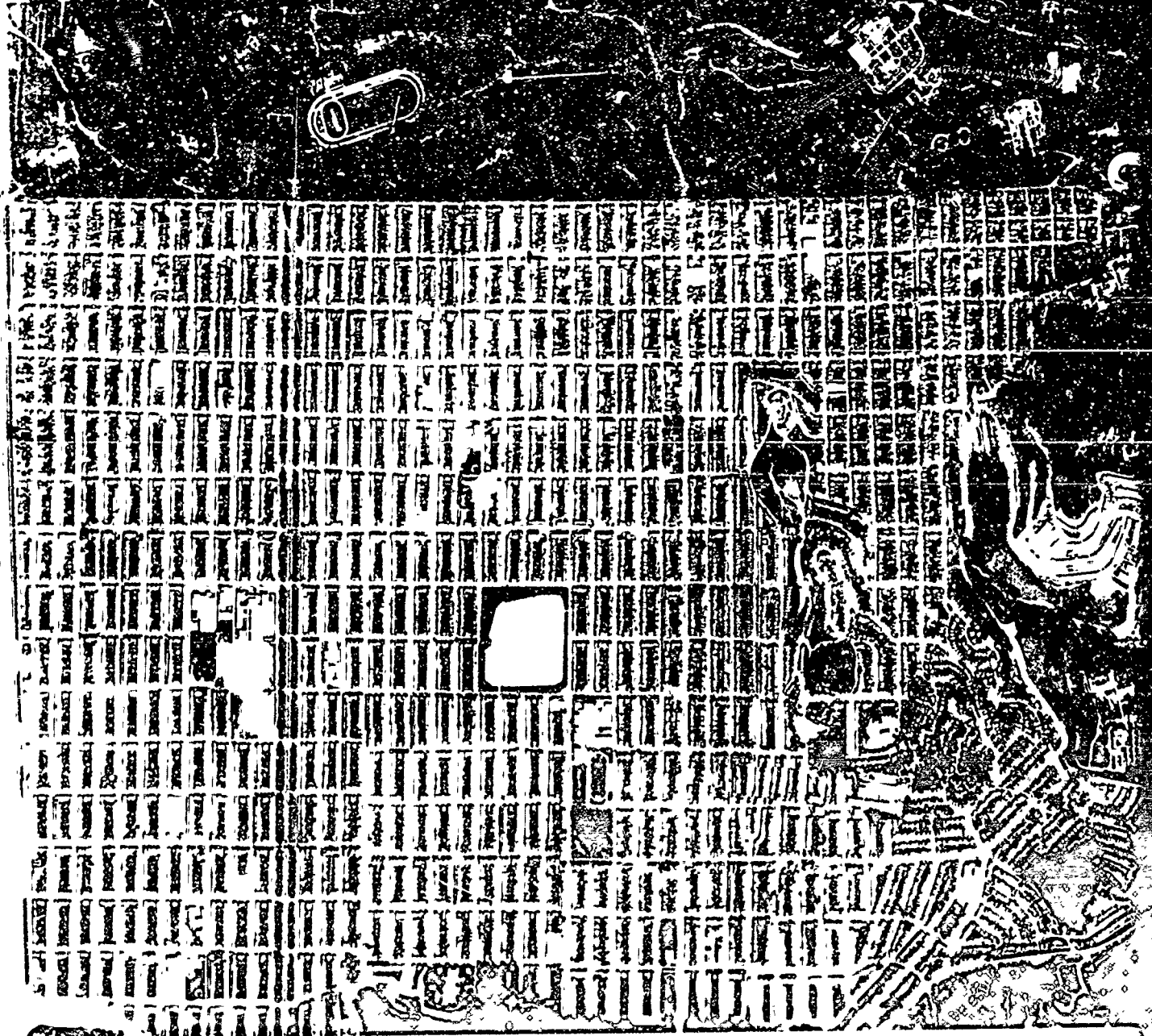
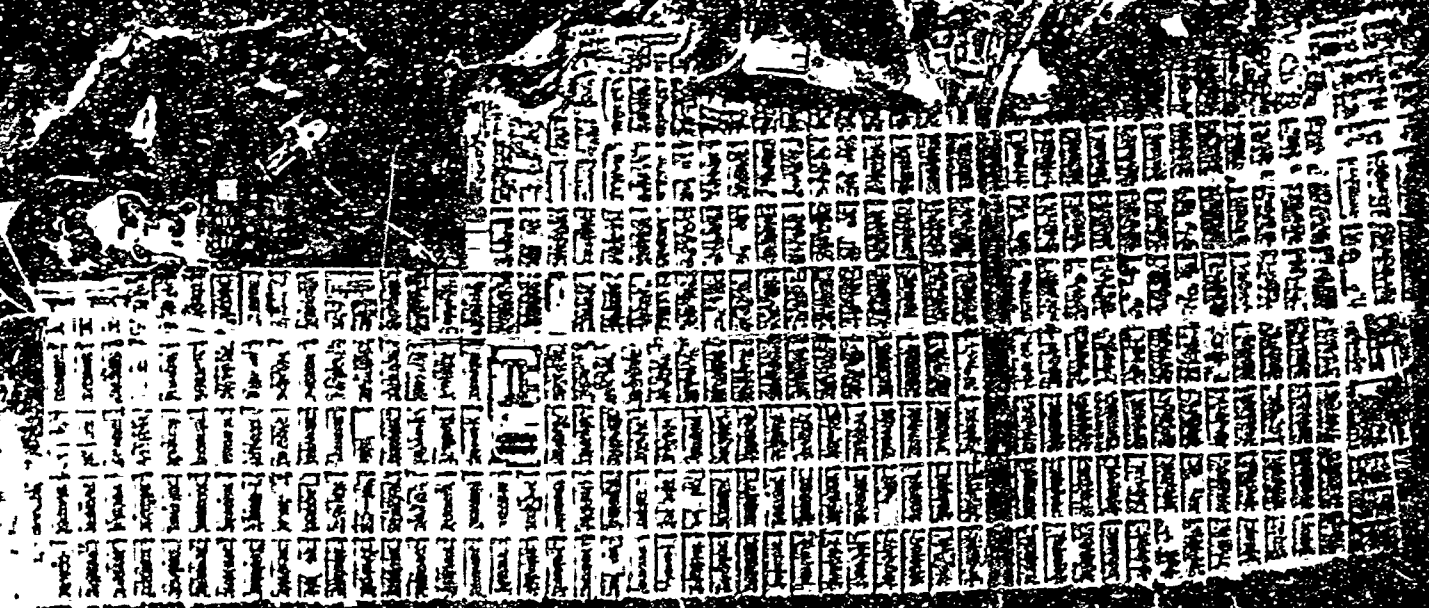






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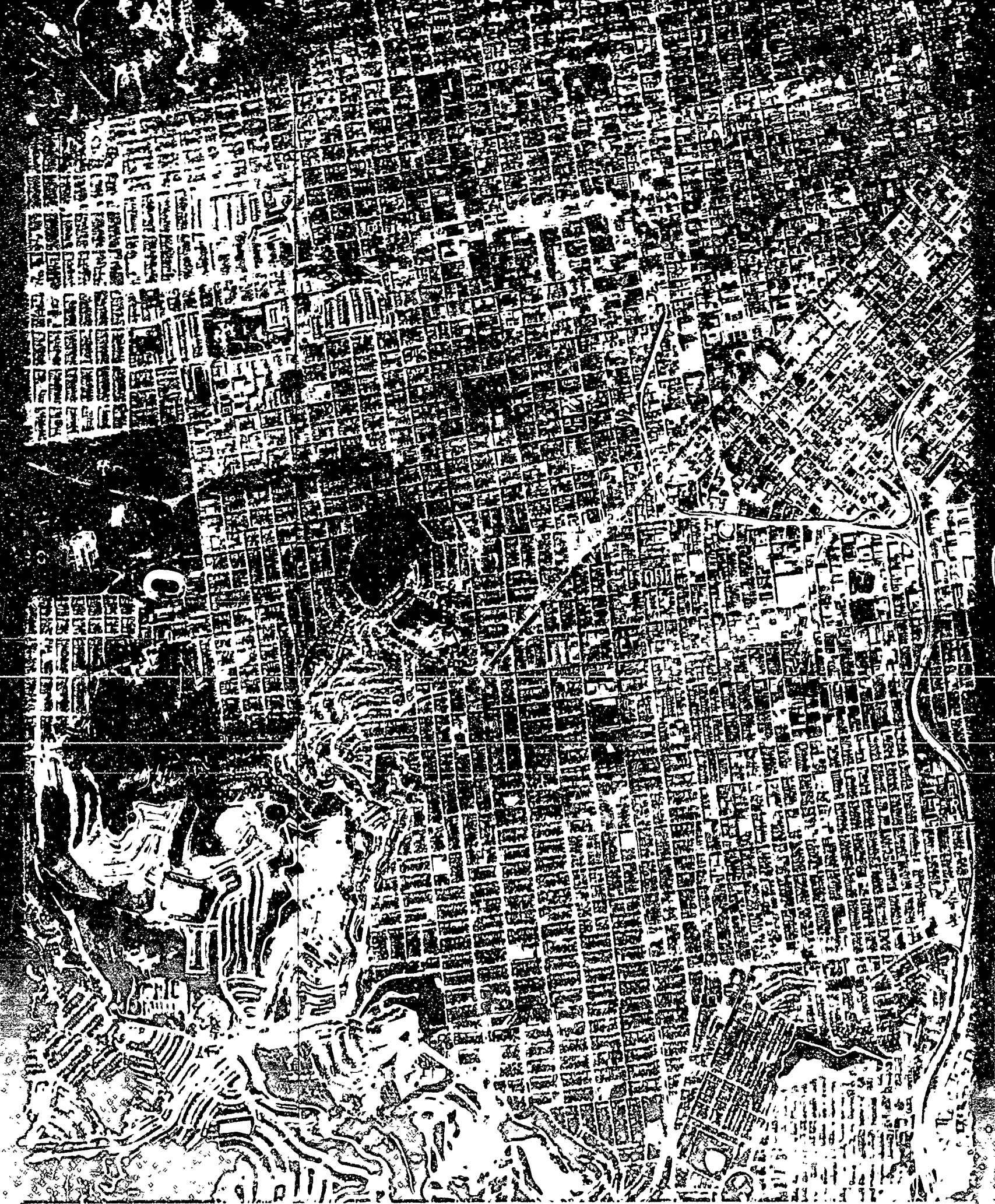


Fig. 4 San Francisco Photographic Map



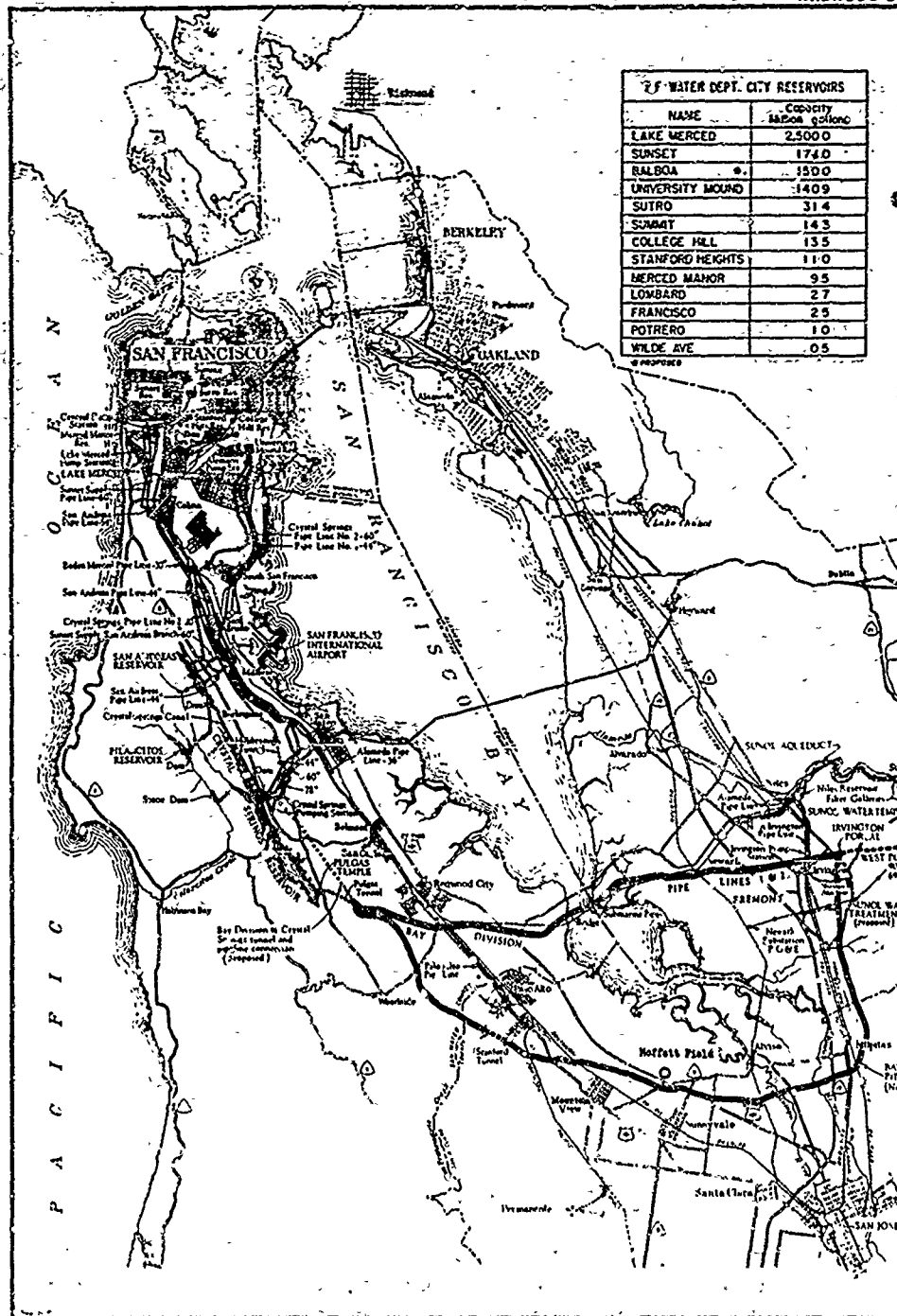


Fig. 5 San Francisco Water Department City Reservoirs and Capacities

the large earthquake and fire in 1906, the city placed over 150 cisterns underground in various parts of the city. These cisterns are maintained today for the exclusive use of the Fire Department and contain up to 75,000 gallons each. In addition there are two stations for pumping water out of San Francisco Bay.

## 5.2 WEAPON EFFECTS

The first weapon affecting San Francisco (No. 154 in Table 1) is a 5-megaton airburst on Moffett Field, California, about 35 miles south of the city. Blast overpressures from this weapon are great enough in San Francisco (0.5 to 1.0 psi) to break windows in buildings throughout the city.\* The second weapon affecting San Francisco is the Richmond 5-megaton surface burst (No. 321 in Table 1), about eight miles north of San Francisco, near the eastern terminus of the Richmond-San Rafael Bridge.

Fire problems in the city are caused by this second weapon. Incident thermal energy at 8 miles (north shore of San Francisco) is 25 to 30 cal/cm<sup>2</sup>. The maximum blast overpressures<sup>9</sup> in San Francisco from the burst near Richmond are between 2 and 3 psi. The assumption is made that the damage produced by overpressures of this magnitude will not hamper fire-department operations. The area of San Francisco suffering greatest blast damage will be so heavily fire-involved that blast debris will be a relatively insignificant problem for the Fire Service.

Probability of the occurrence of significant fire as a function of distance from ground zero was computed. Calculation assumptions are:

1. Weapon yield is 5 megatons.
2. Height of burst is 0, on San Francisco Bay.
3. Depth of water near ground zero ranges from 7 to 20 feet.
4. Visibility is 15 miles (clear, no clouds or fog).
5. Relative humidity is 30%.
6. Probability criteria: At a distance comparable to the distance for threshold ignition of dark newsprint (about 5-8 cal/cm<sup>2</sup>), 1 out of every 100 exposed buildings will be destroyed by fire; at the

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\* Overpressure data were obtained from Ref. 9.

distance for threshold ignition of dark upholstery or drapery fabric, 9 out of 10 exposed buildings will be destroyed by fire.\* Figure 6 shows a plot of the calculated values of probability of significant fire occurrence vs distance from ground zero.

### 5.3 LOCATION OF FIRES

Techniques for predicting the location of initial significant fires in San Francisco following detonation of the bomb near Richmond included the use of aerial photography. Oblique aerial photographs were taken by means of a HyAc Panoramic 70-mm camera system mounted in a Cessna 172.\*\* Photographs of San Francisco were taken at altitudes of 2000, 3000, 5000, 7000, and 10,000 feet from a position south of the eastern terminus of the San Rafael-Richmond Bridge (which is the assumed location of the hypothetical ground zero for the Richmond explosion). In addition, photographs on the same aspect angle as those taken at ground zero (but closer-in) were made to obtain the detail required for photointerpretation. These photographs provided a "bomb's eye" view of the city and enabled identification of both the areas exposed by line of sight to thermal energy from the rising fireball and those areas shadowed by intervening hills, buildings, etc. Direct overhead vertical photography served as a plotting map for delineating initial fire areas within the city. The calculated probabilities of significant fire occurrence were correlated with the results of the photographic analysis. Figures 7, 9, 11, 13, and 15 show estimated degree of fire involvement by area for San Francisco. Figures 8, 10, 12, 14, and 16 are reduced copies of the photographs used to define the fire areas. Figure 7 was used for the example selected to represent the initial fire situation in a presentation to members of the San Francisco Fire Department and shows the areas exposed during the period when maximum thermal energy is being emitted by the fireball.

Figures 9, 11, 13, and 15 show the areas exposed to the fireball as it rises to 10,000 feet. Although Fig. 7 was used for the example,

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\* Data relative to the probability of the occurrence of significant fires and associated criteria was obtained from Mr. Stanley B. Martin, formerly with NRDL and currently with URS Corporation, Burlingame, California.

\*\* The oblique aerial photographs and assistance with the photointerpretation task were provided by the Itek Corporation, Vidya Division, Palo Alto, California.



Figs. 9, 11, 13, and 15 are included because (1) they reveal that at higher altitudes terrain shielding is insignificant even though San Francisco has many steep hills and (2) they show areas which may be ignited if the thermal pulse continues to emit sufficient energy and (3) they show potential ignition areas if an air burst (burst height 10,000 feet or lower) is considered.

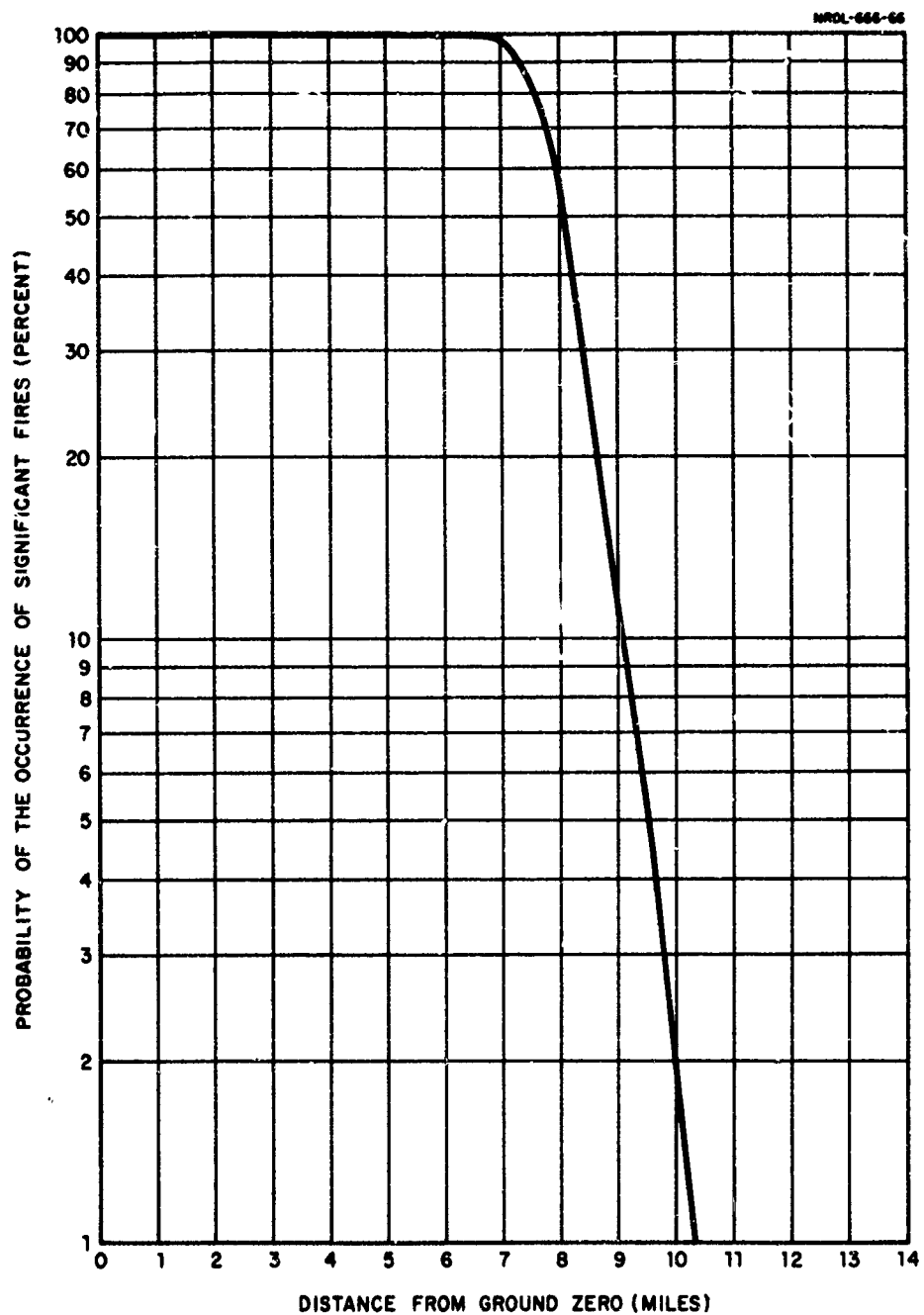


Fig. 6 Probability of the Occurrence of Significant Fires  
versus Distance from Ground Zero

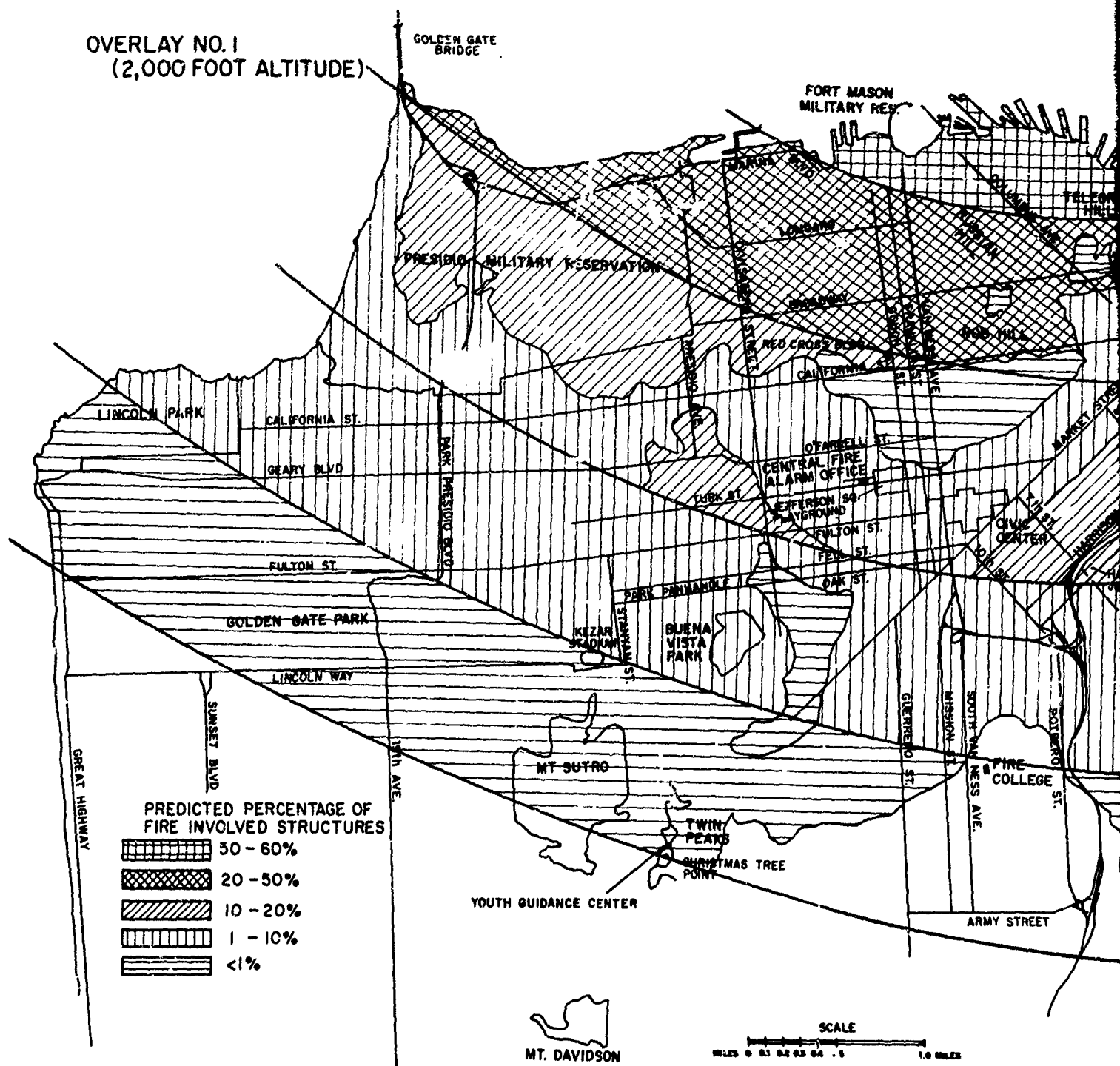


Fig. 7 Predicted Fire Areas (Based on an oblique aerial photograph taken at an altitude of 2,000 feet)

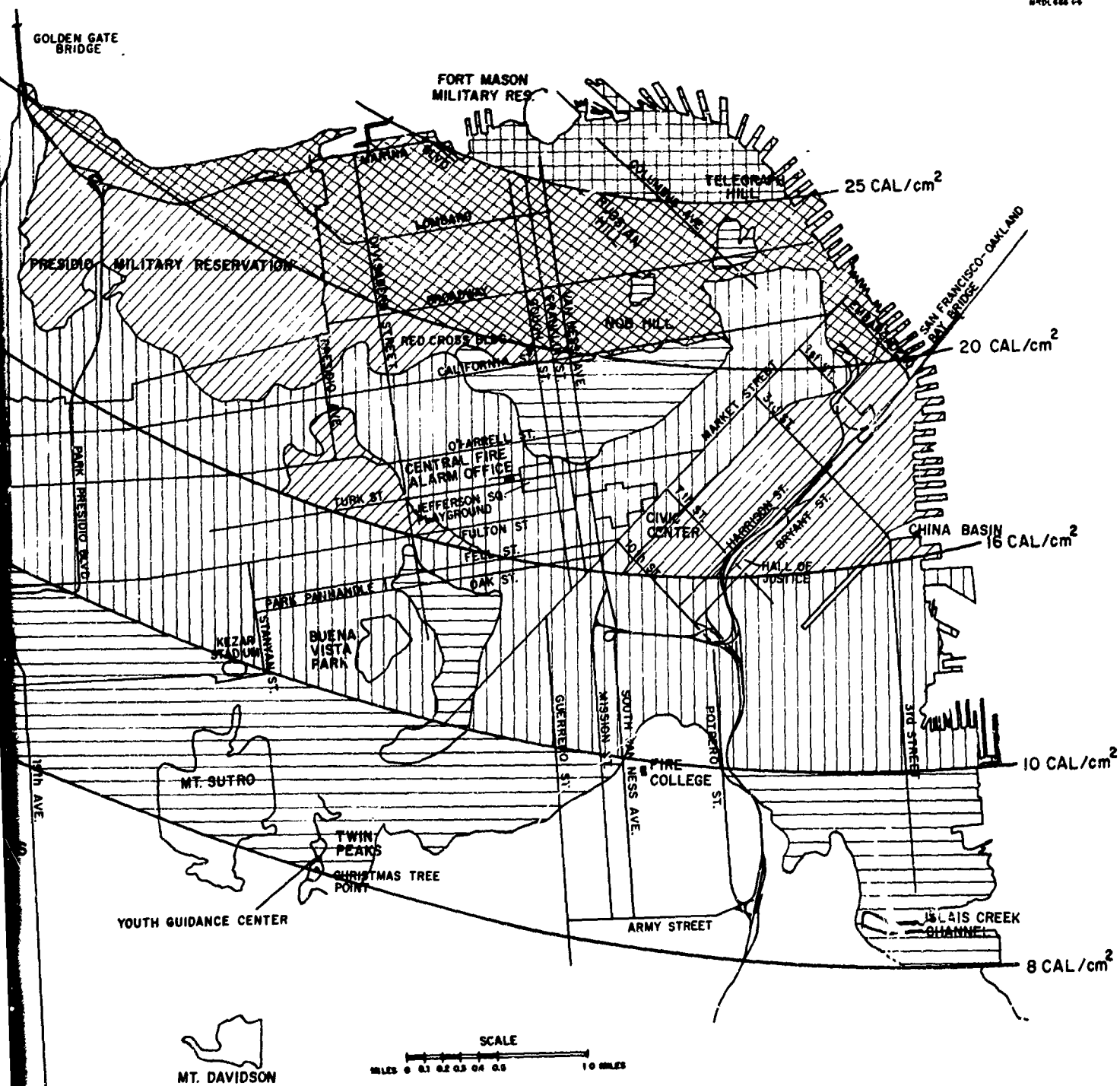


Fig. 7 Predicted Fire Areas (Based on an oblique aerial photograph taken at an altitude of 2,000 feet)

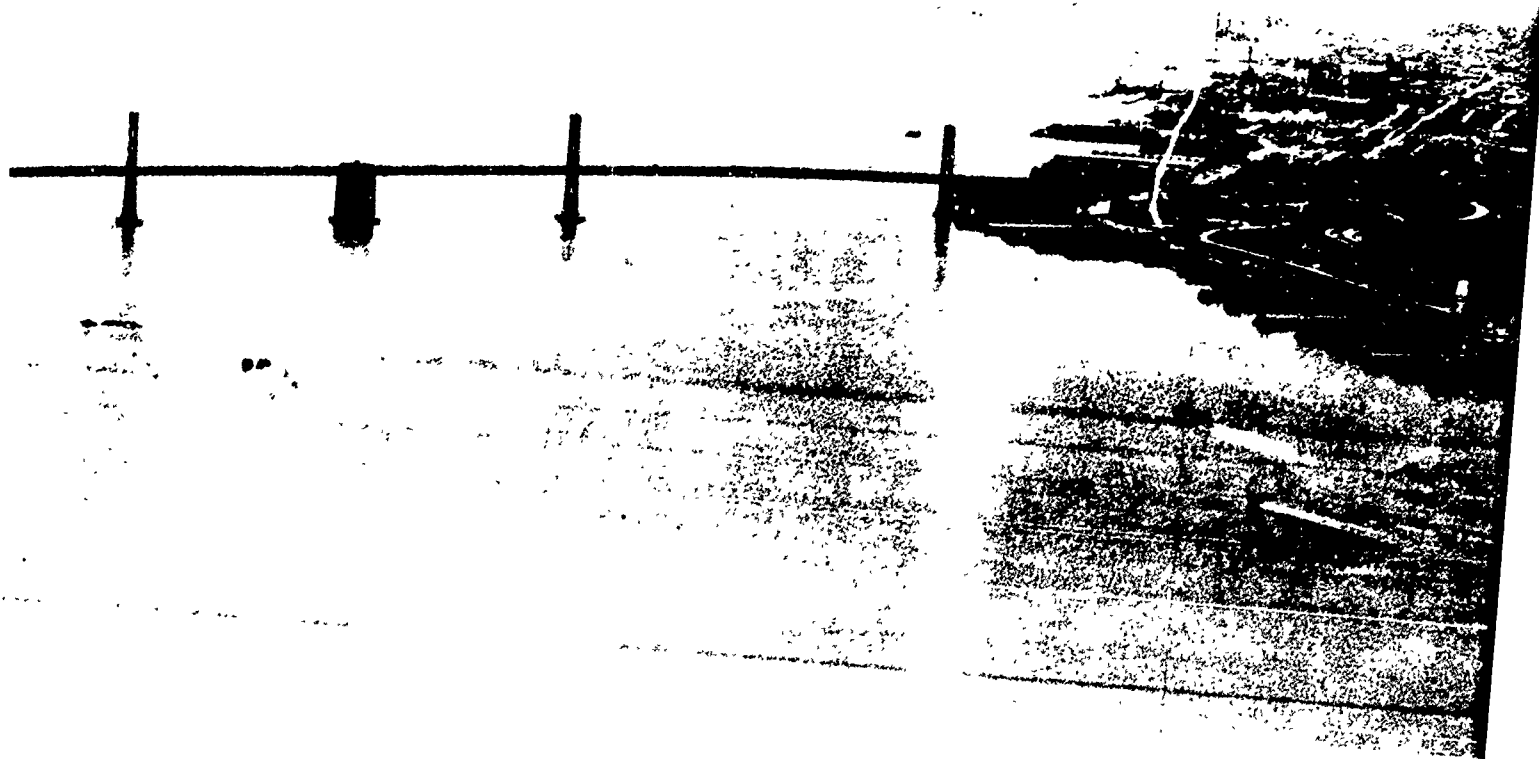


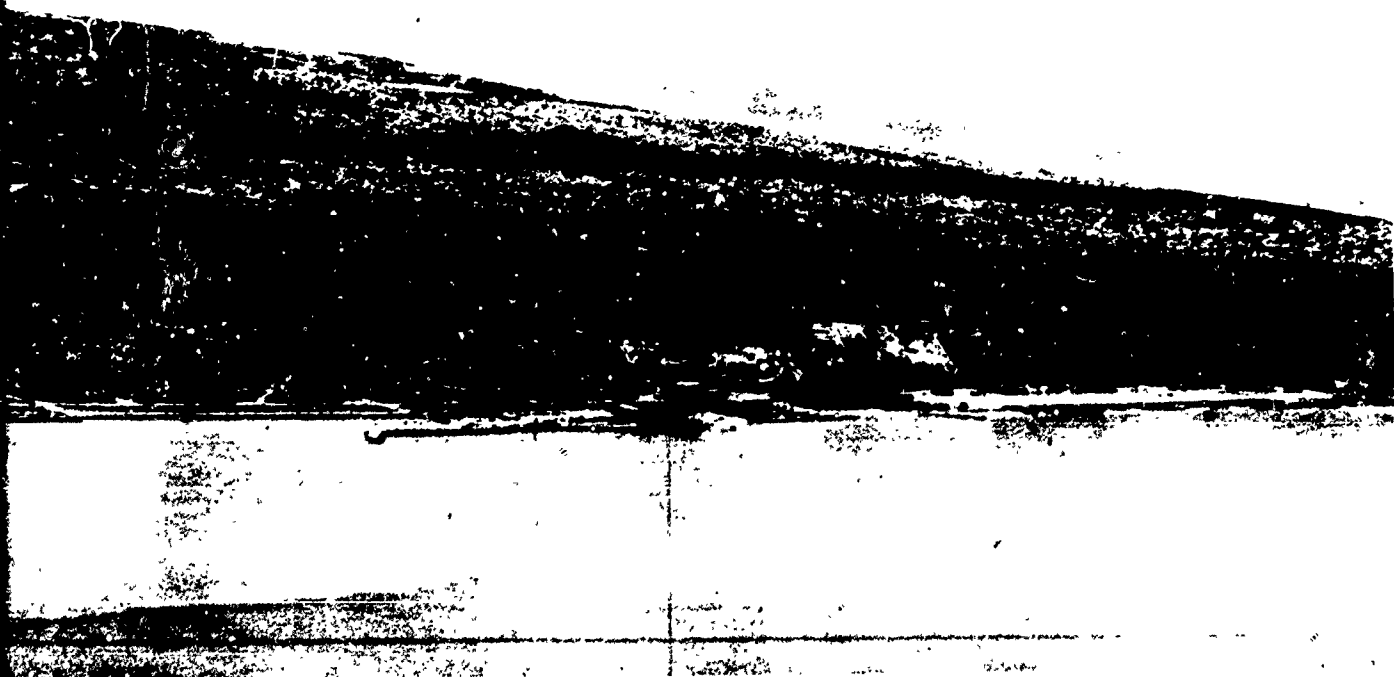


Fig. 8 Oblique Aerial Photograph used to obtain Fl



to obtain Figure 7

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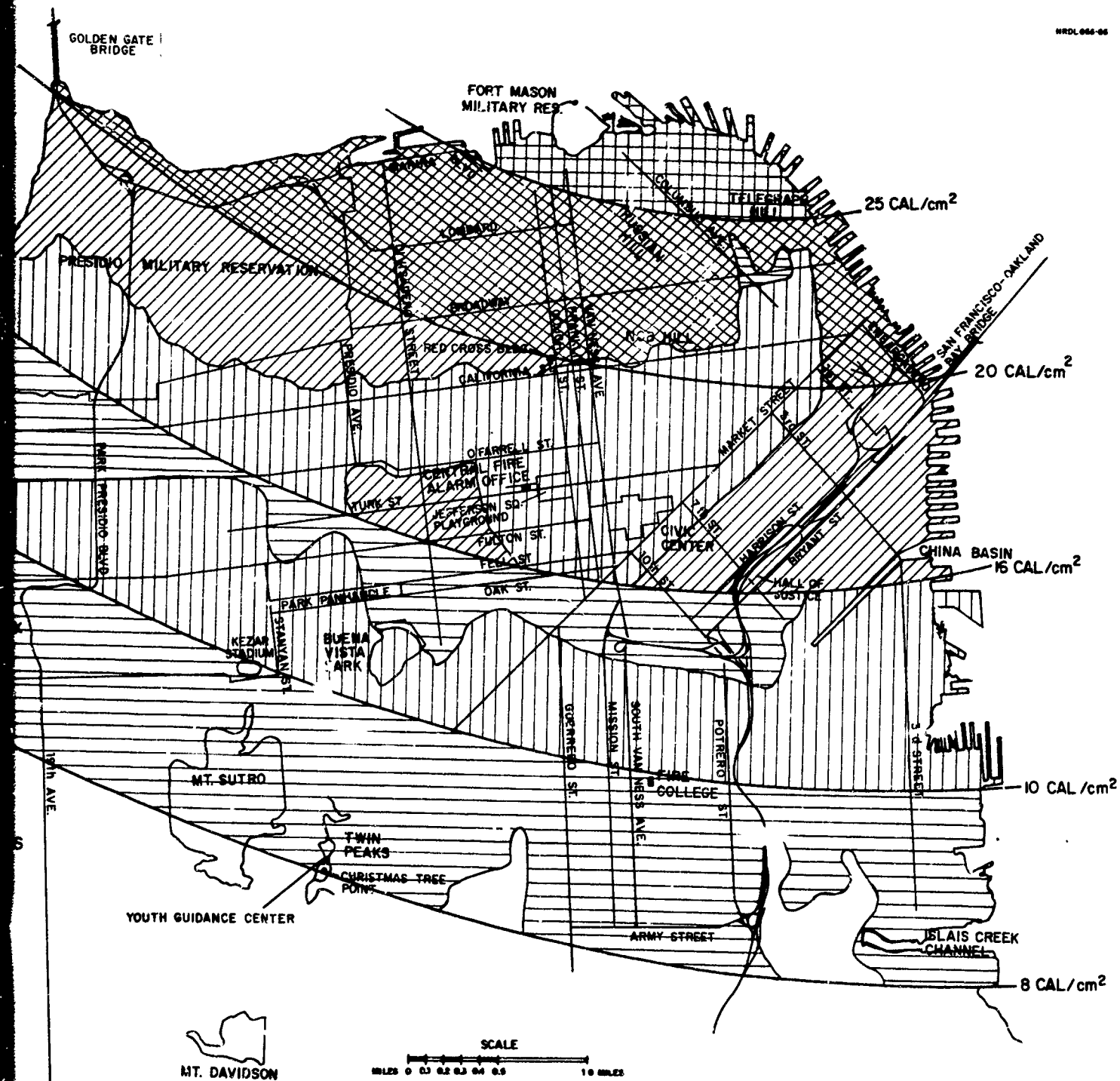


Fig. 9 Predicted Fire Areas (Based on an oblique aerial photograph taken at an altitude of 3,000 feet)



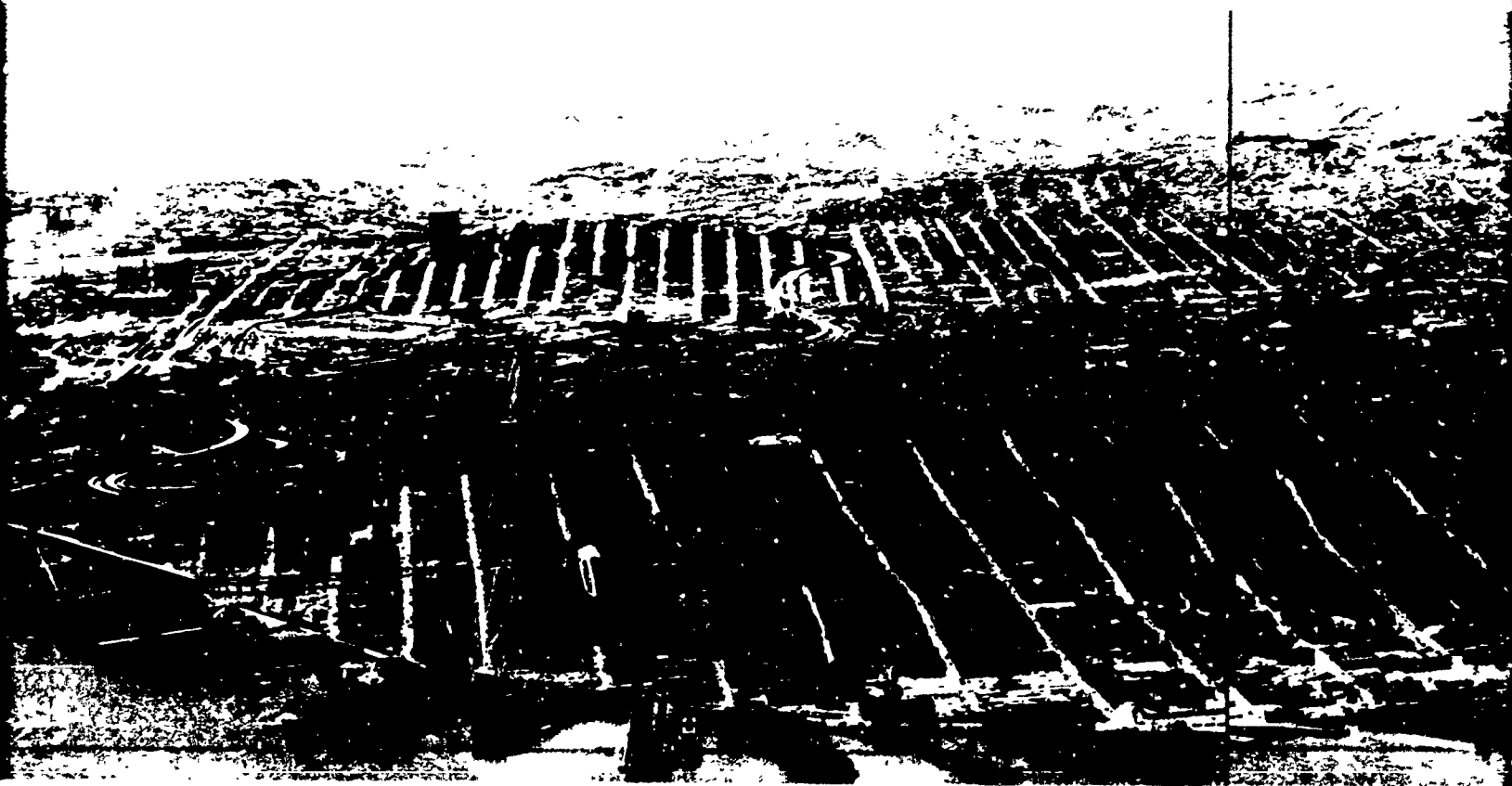
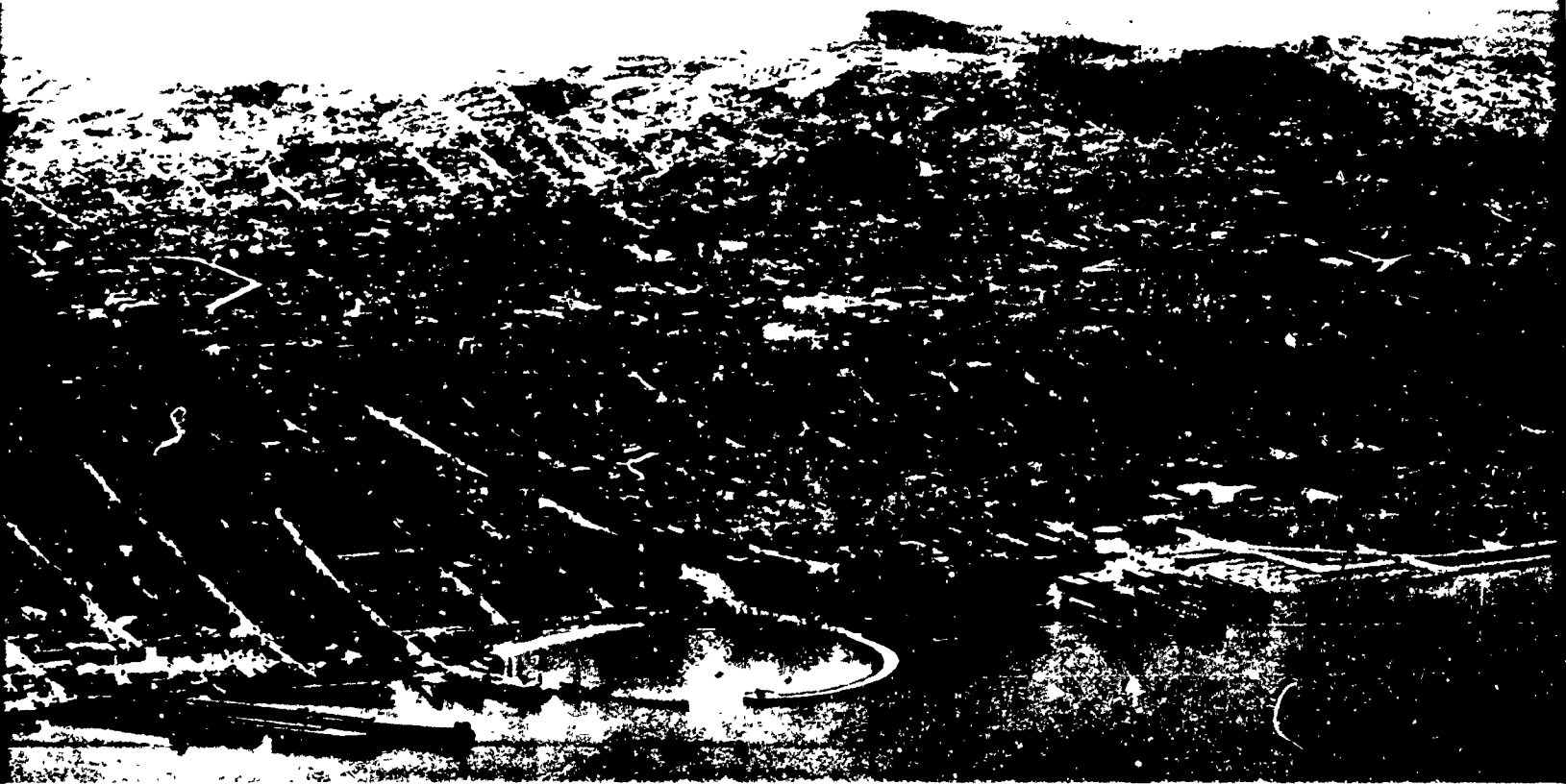


Fig. 10 Oblique Aerial Photograph us



Photograph used to obtain Figure 9

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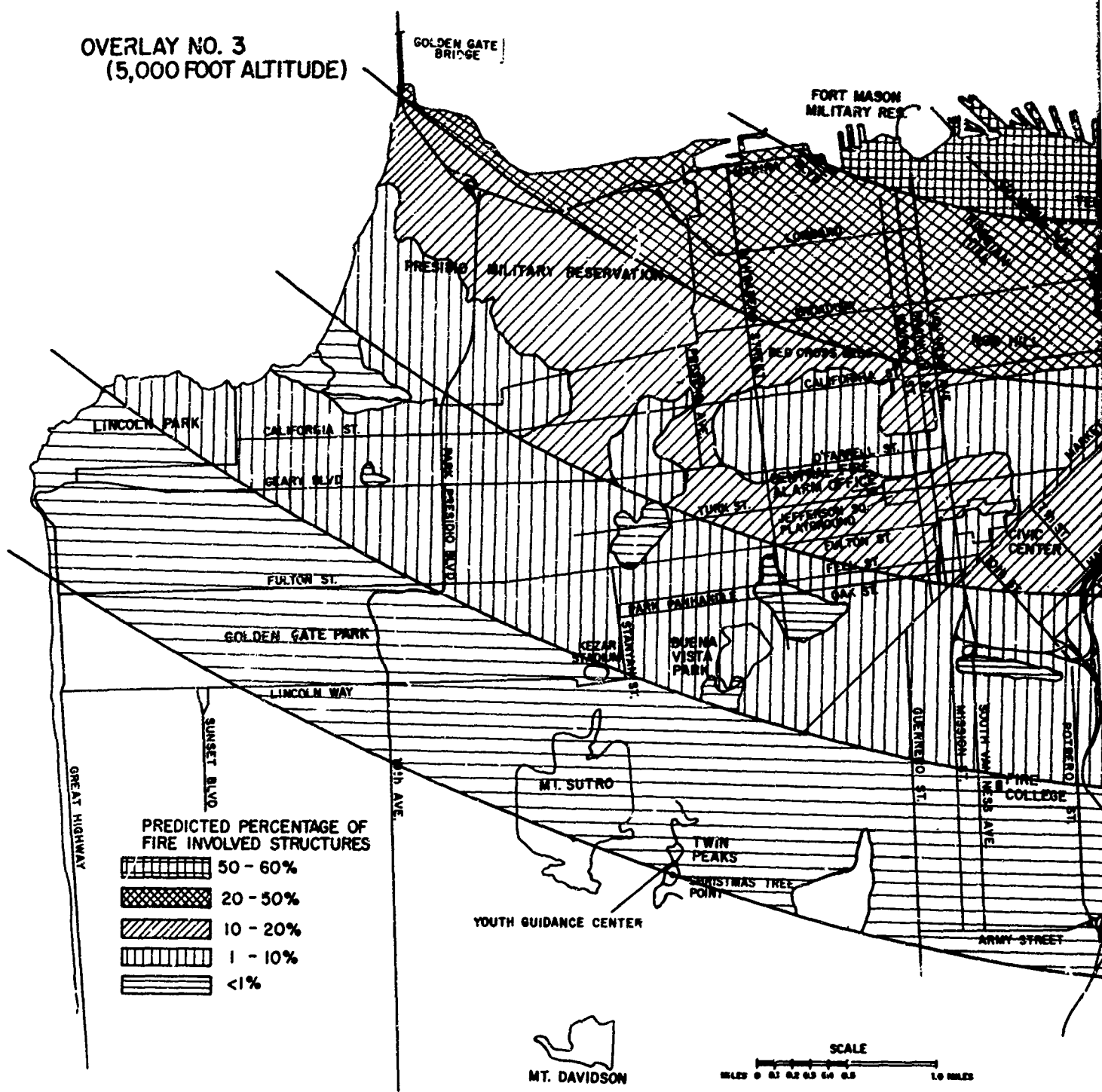


Fig. 11 Predicted Fire Areas (Based on an oblique aerial photograph taken at an altitude of 5,000 feet)

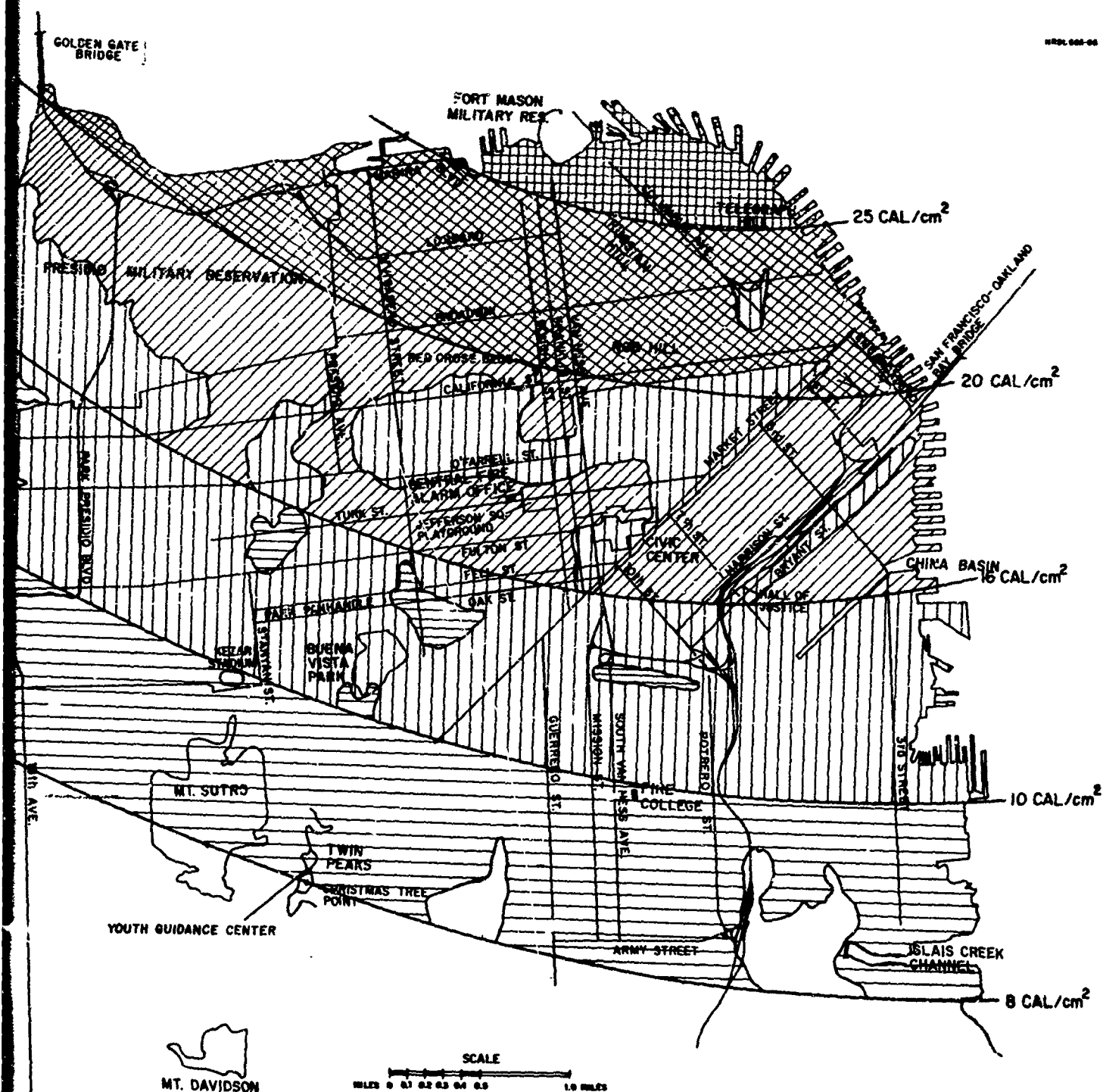


Fig. 11 Predicted Fire Areas (Based on an oblique aerial photograph taken at an altitude of 5,000 feet)



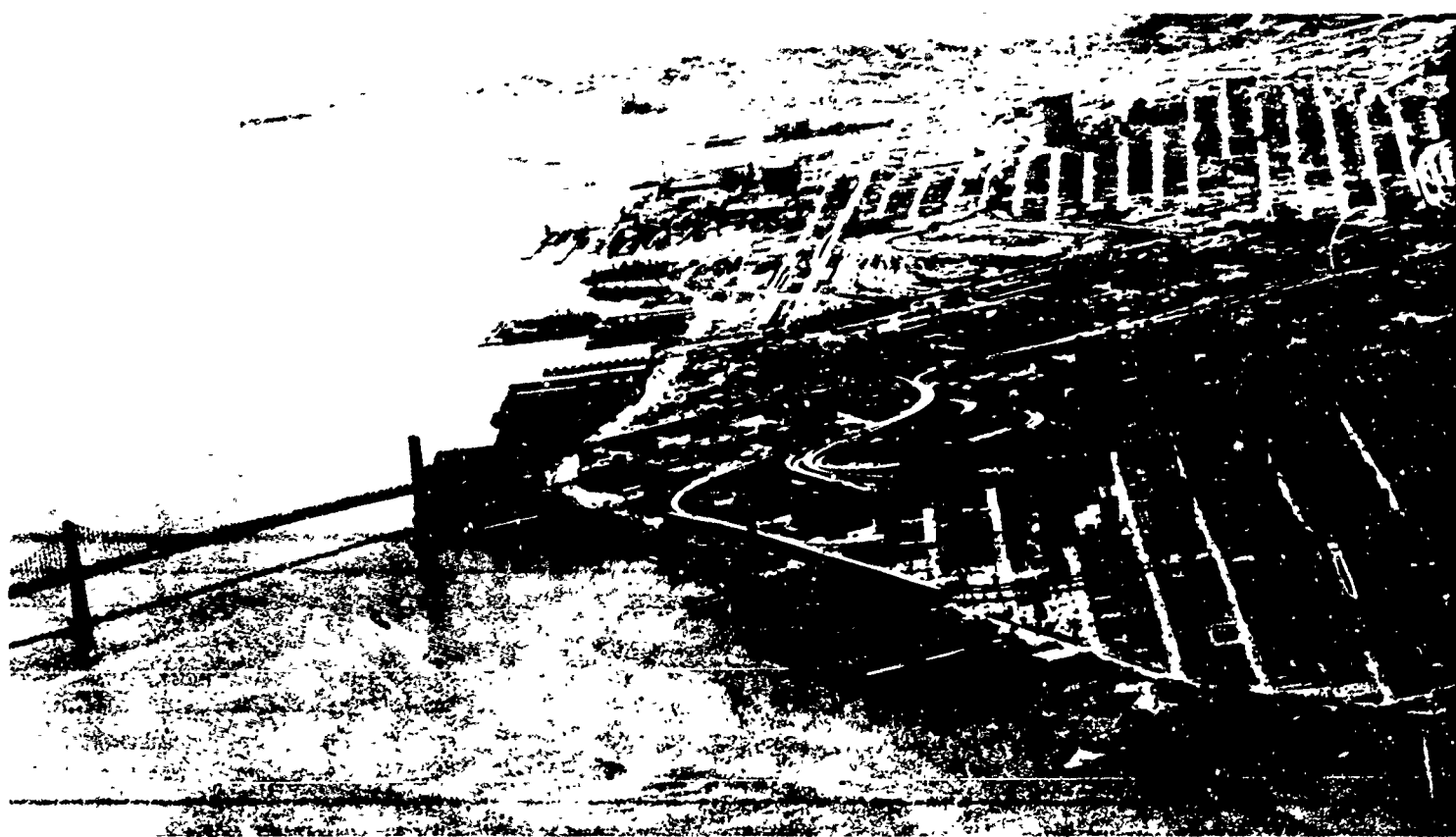
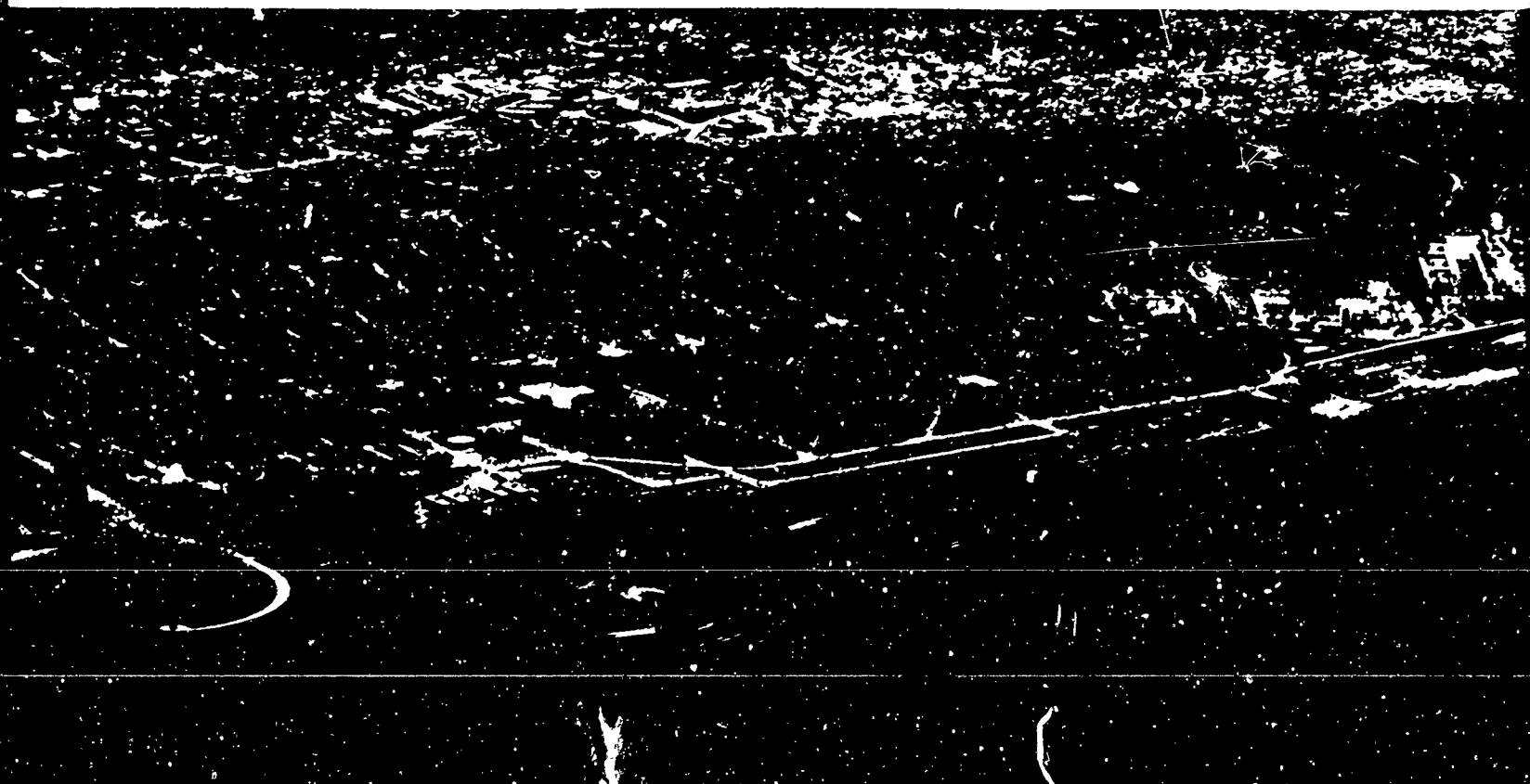


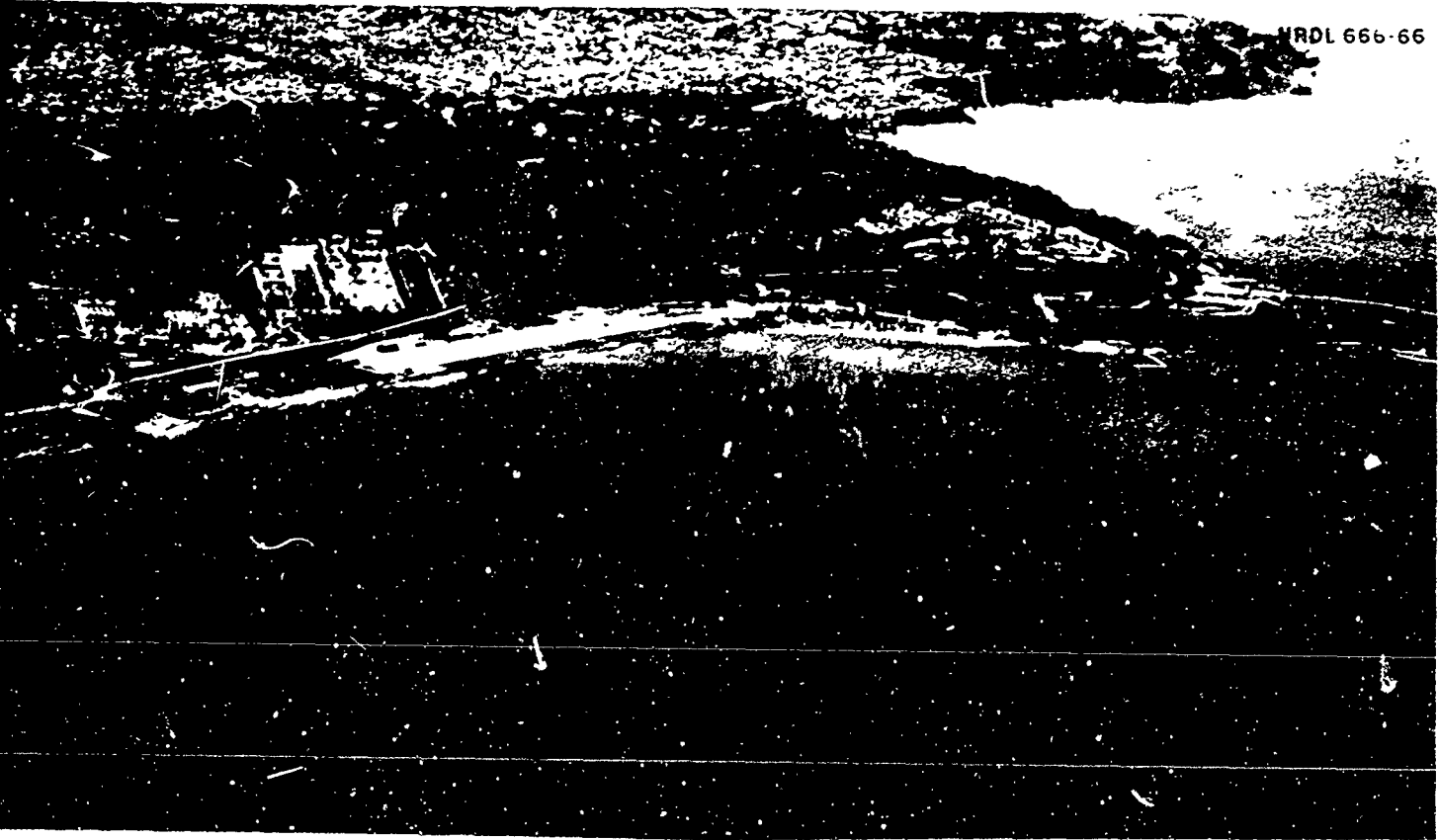


Fig. 12 Oblique Aerial Photograph used to c



graph used to obtain Figure 11

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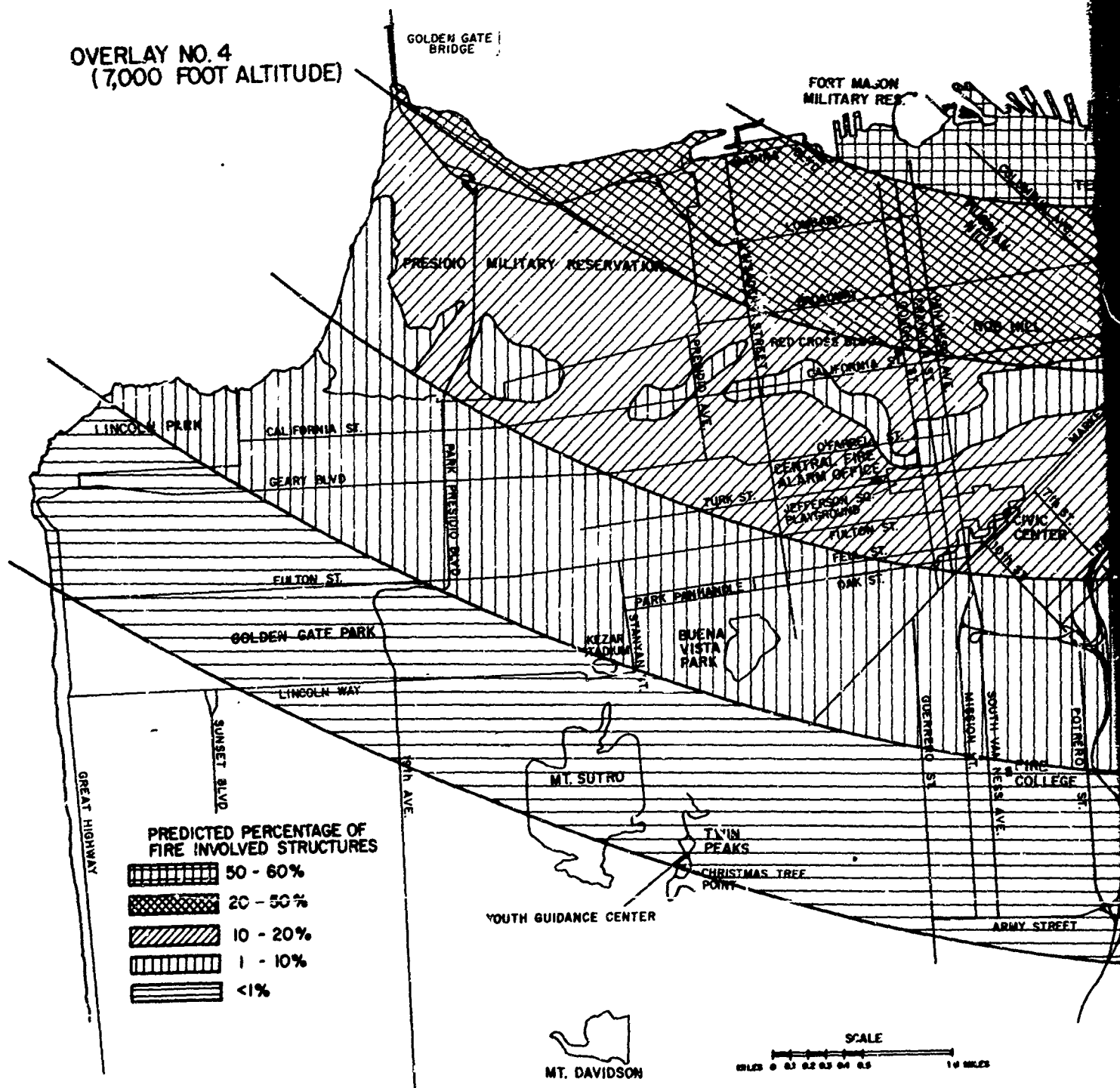


Fig. 13 Predicted Fire Areas (Based on an oblique aerial photograph taken at an altitude of 7,000 feet)

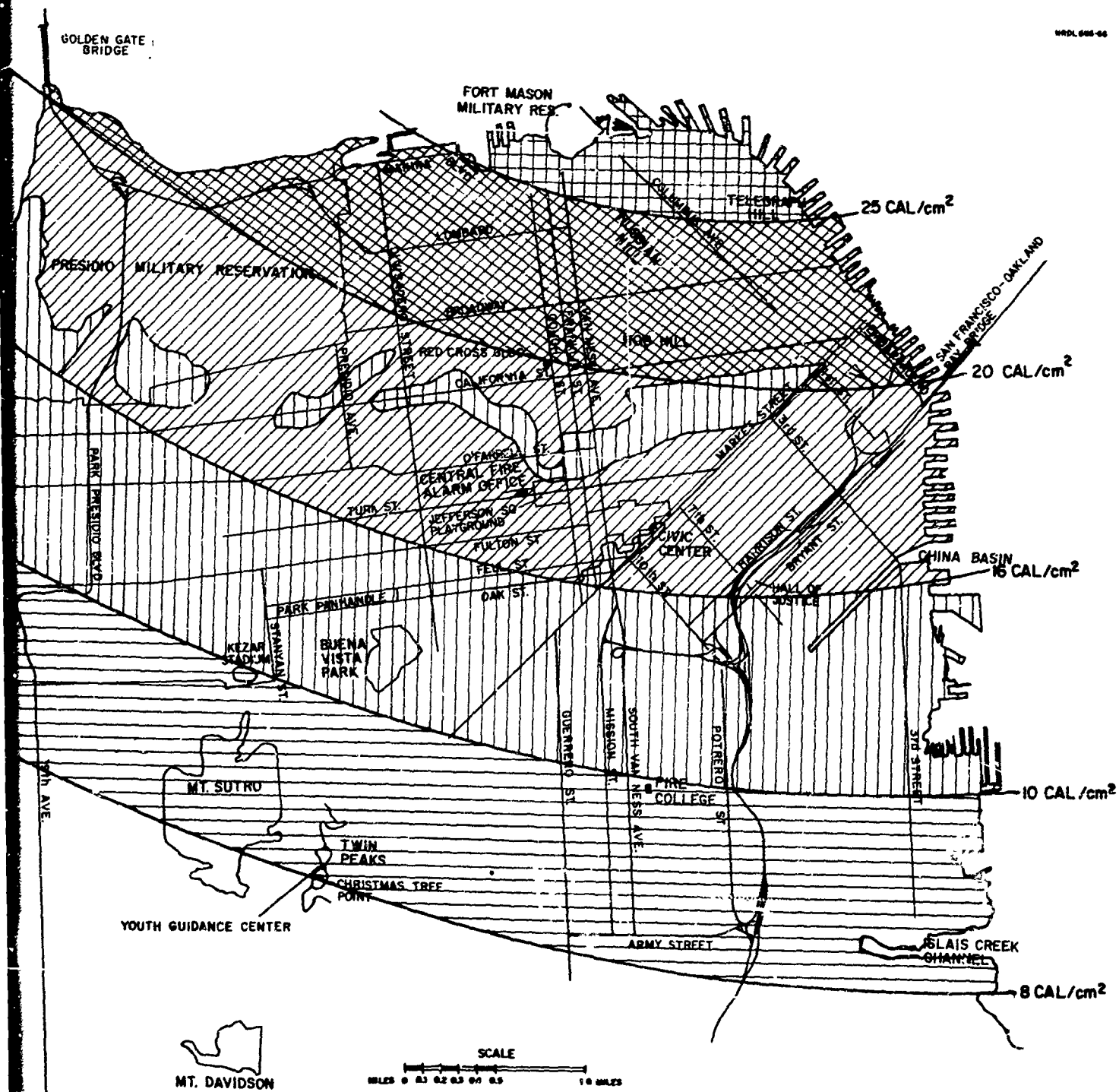


Fig. 13 Predicted Fire Areas (Based on an oblique aerial photograph taken at an altitude of 7,000 feet)



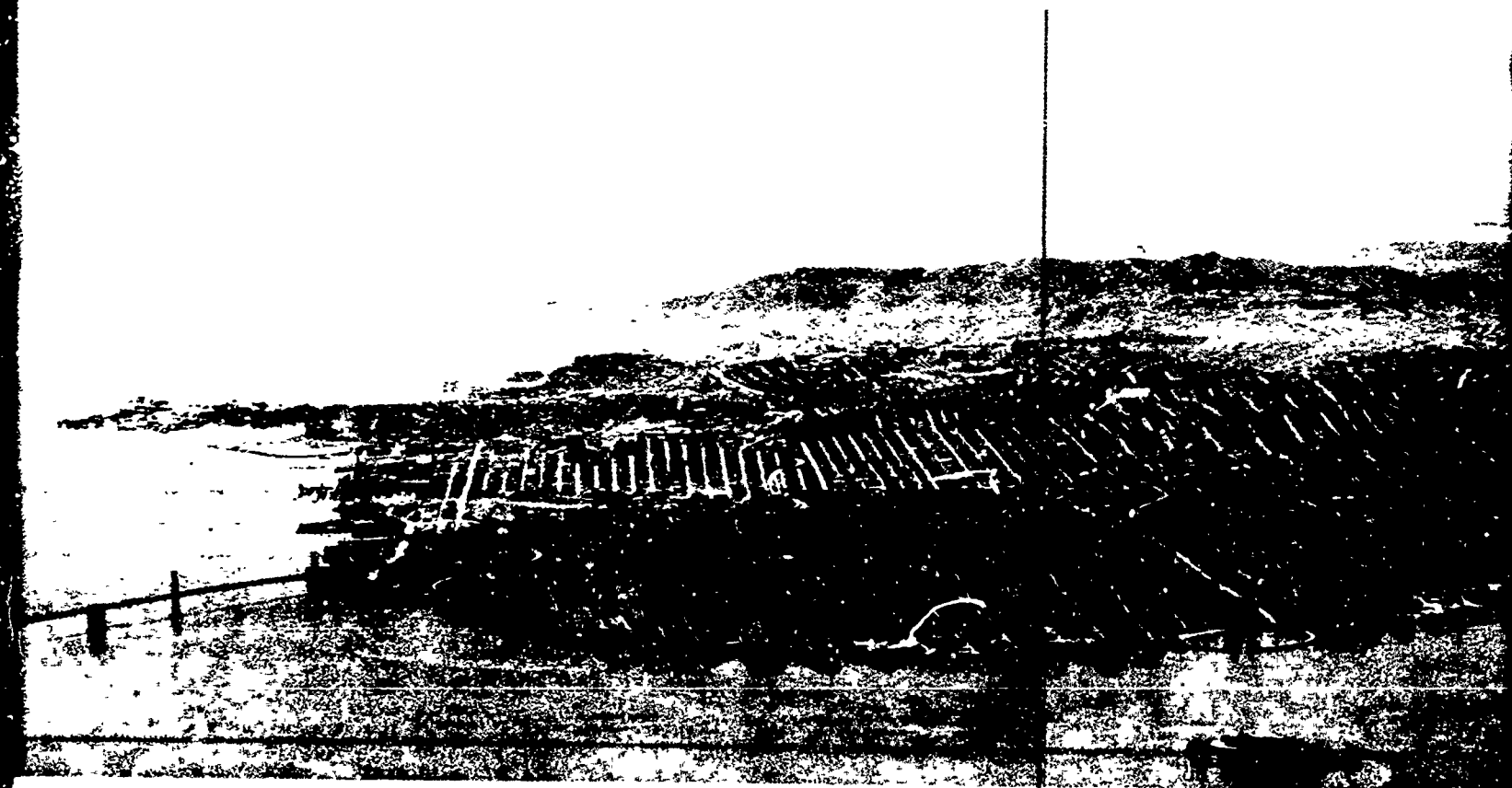


Fig. 14 Oblique Aerial Photograph used to obtain Fig





to obtain Figure 13

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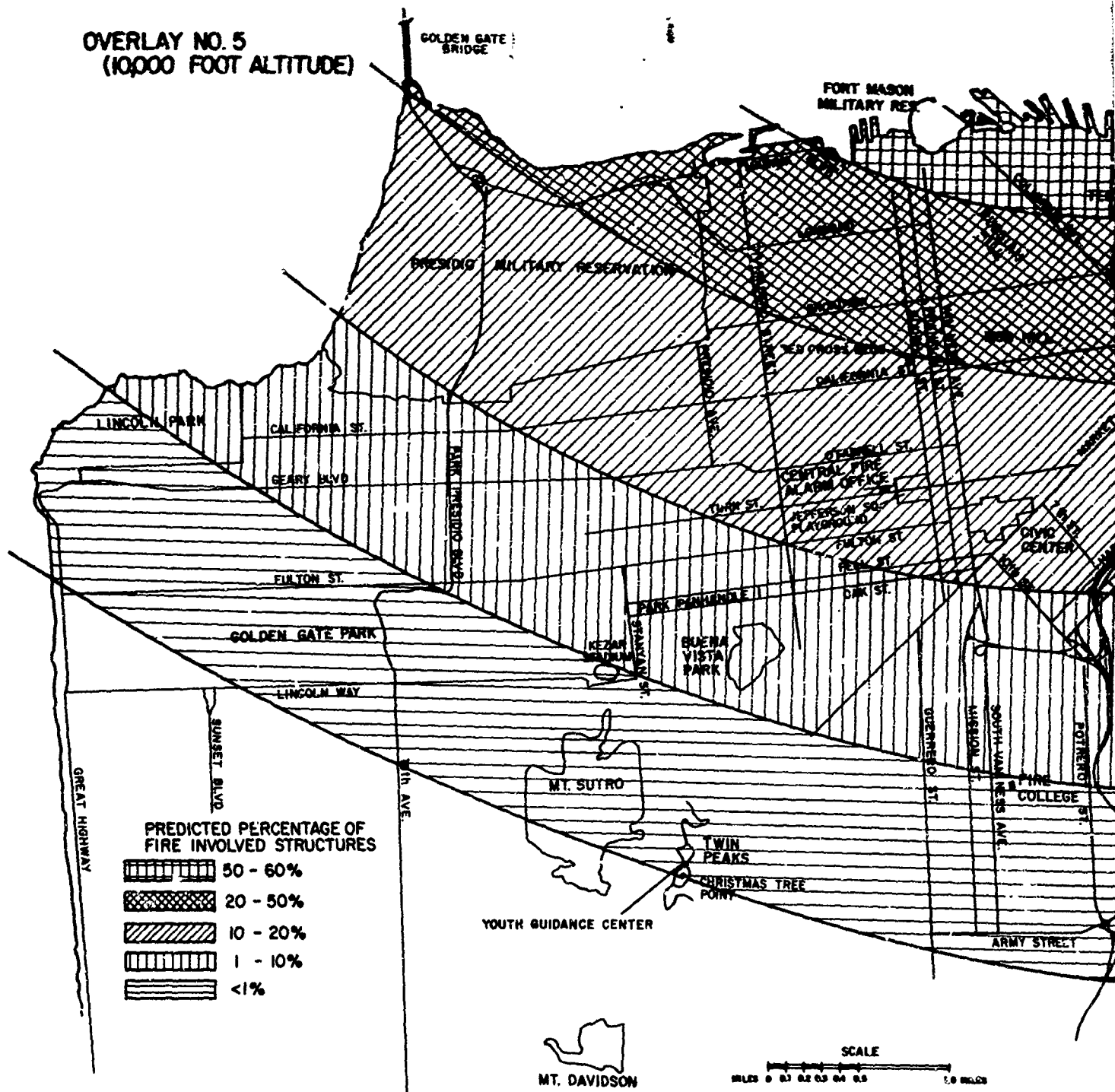


Fig. 15 Predicted Fire Areas (Based on an oblique aerial Photograph taken at an altitude of 10,000 feet)





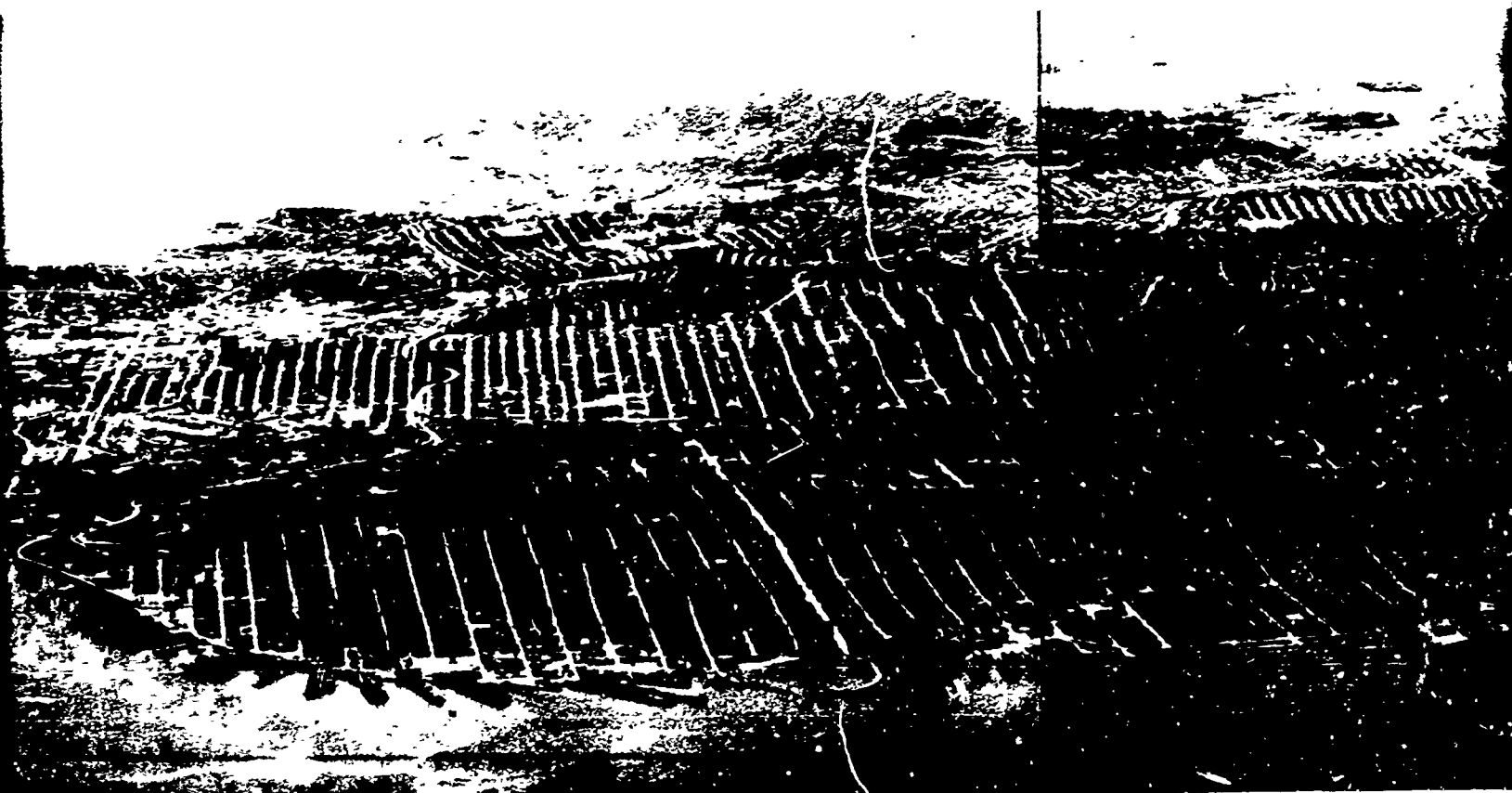
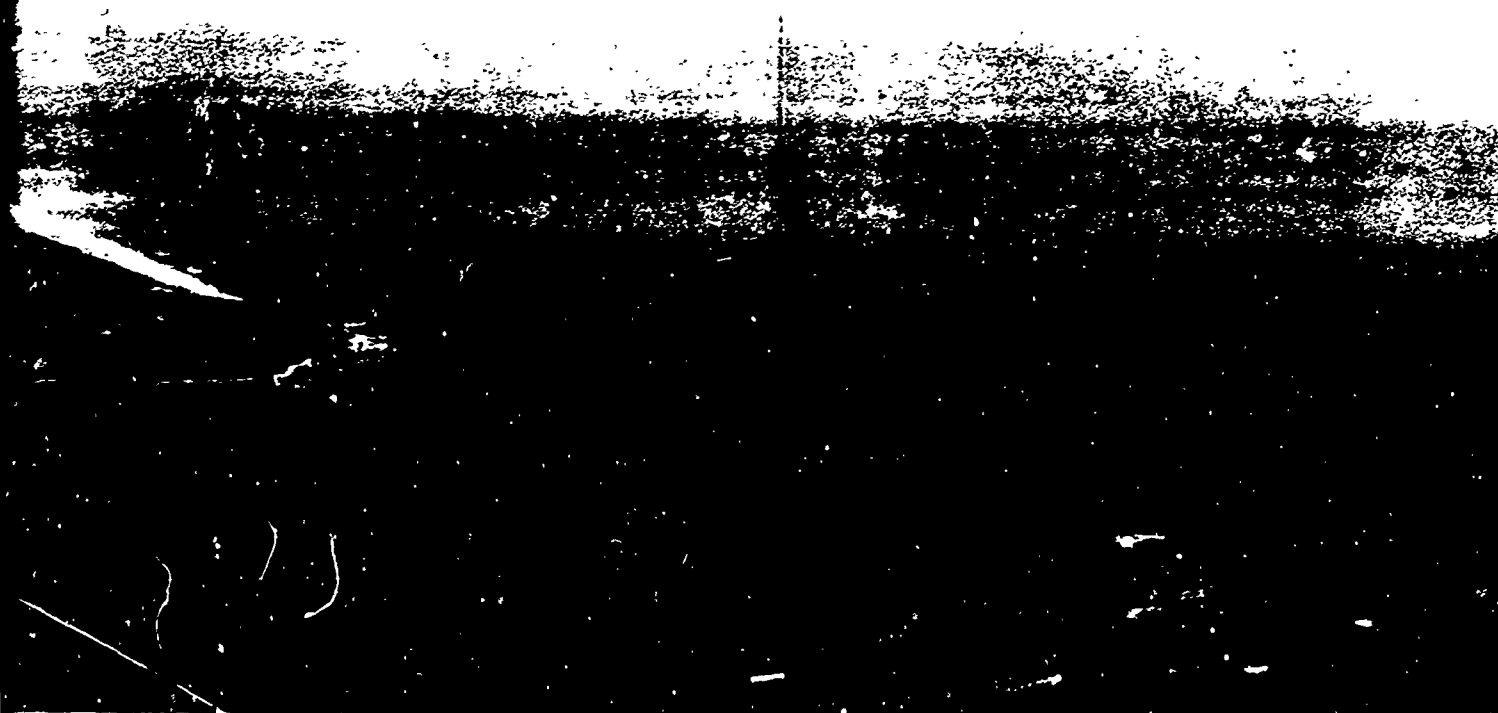


Fig. 16 Oblique Aerial Photograph used to obtain Fi



used to obtain Figure 15

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## SECTION 6.

### FIRE INFORMATION FOR FIRE SERVICE OPERATIONS AND EOC'S

#### 6.1 GENERAL

A brief discussion of Fire Service Doctrine based on discussions with San Francisco Fire Department personnel is included in Subsection 6.1.1 to illustrate the fact that firemen are trained to cope with emergency situations, peacetime or wartime, in an efficient manner irrespective of the availability of communicated fire information. A description of postattack fire-fighting concepts (Subsection 6.1.2) is included for the purpose of describing various contingent situations that might occur following nuclear attack. The initial fire situation and assumed post-attack actions in San Francisco are recapitulated in Subsection 6.1.3. Remaining subsections describe fire-fighting strategy and associated information, information flow, information form and frequency, EOC use of fire information, and information for higher civil-defense echelons.

##### 6.1.1 Fire Service Doctrine

A fireman is trained from the beginning of his career in self-reliance and resourcefulness. Standard Fire Department procedures require that the senior fireman at the fire scene take full command and direct operations until he is relieved by a superior officer. This procedure fosters the development of command responsibility, which would be vitally needed in time of war when Fire Division and Battalion Chiefs may not be available to direct fire-fighting operations.

Capability for communicating information between fire-site command posts and the Central Fire Alarm Office and/or the EOC (in some cities the latter two may be the same) is important to effective fire operations. Lack of the exchange of information would not, however, prevent fire-fighting operations.

##### 6.1.2 Postattack Fire-Fighting Concepts

In defining the fire information required following nuclear attack, it is necessary to consider two factors. First, fires from a nuclear attack will be essentially a local problem. In peacetime, aid from

adjacent communities or from various segments of the State Fire Organization is available (see Subsection 3.4 on "Mutual Aid"). In an attack of the magnitude described in Section 4, neighboring communities will probably be too busy to provide effective mutual aid.\* For this reason, responsibility for postattack fire control will rest, in most instances, exclusively on local fire forces. Secondly, the required fire information will depend upon the specific postattack activities of the fire department which, in turn, will be determined by weapon effects. Events that determine what these activities will be are discussed in this subsection.

#### 6.1.2.1 Limiting Fire-Fighting Activities

Under certain circumstances, the local government of a city suffering nuclear attack may decide to limit or abandon fire-fighting activities. These circumstances include:

1. Numerous casualties (particularly among members of the fire-fighting forces).
2. Imminent threat of a repeat attack.
3. Significant damage to water resources (supply, pumping systems, mains, etc.).
4. Necessity for conservation of water for maintaining the health and sanitation of survivors.
5. Existence of one or more fires that become immediately so large or uncontrollable that it is impractical to attempt fire fighting.
6. Existence of a severe nuclear radiation hazard to exposed firemen.

Of these six types of information, four (1, 3, 4, 5) may be classed as fire or fire-control information. Thus even before a detailed fire "sizeup" is carried out, fire-control information is required for an early fundamental decision as to whether or not fire-control forces should in fact be committed as a result of a given attack.

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\* The State of California receives a total of 168.5 megatons delivered on 38 targets. It is noted, incidentally, that access from the North and East to San Francisco would depend on survival of two long vulnerable bridges, not assumed to be damaged in the present case.

In the present case, of course, it is assumed that none of the above conditions exists.

#### 6.1.2.2 Different Fire-Fighting Conditions

Providing that firemen and apparatus have survived the initial weapon effects, there will be different fire-fighting conditions, depending upon the various combinations of weapon effects. These conditions and the resulting levels of possible commitment of firefighting forces are summarized in Table 2.

Table 2  
FIRE-FIGHTING CONDITIONS

Debris Status	FALLOUT HAZARD		
	None	Light	Severe
Light or None	Maximum fire fighting	Rotate firemen between shelter and fire; minimum 2-hour fire shift.	Fire fighting only under very limited conditions
Moderate or Severe	Fire fighting is possible, subject to debris	Rotate firemen, if possible. (Probably not practical)	No fire fighting

In San Francisco, present plans of the local fire and civil defense officers do not call for fighting fires in severe fallout conditions. Limited fire fighting may take place, however, when the expected saving of population is judged (presumably by the Mayor in conjunction with civil defense and fire advisors) to be worth the probable loss of fire fighters' lives.

If the fallout radiation is not an extreme hazard, fire-fighting crews could conceivably be rotated between the fire scenes and the shelters to reduce radiation casualties among firemen, providing sufficient numbers of firemen are available and the exposure cycle can be of sufficient duration to make rotation practical. In such an emergency, an exposure cycle could be defined as the maximum time period a fireman could be exposed to radiation without suffering radiation effects (i.e.,

exposures of the order of 100 roentgens). If the maximum exposure cycle is two or more hours, then, in some situations, crew rotation might be feasible.

In any case, it is noted that a general decision on level of commitment possible must be made at least implicitly on the basis of early reports involving fallout assessment and extent of blast damage and debris.

As noted, weapon effects for the example case (San Francisco) correspond to the combination of no fallout hazard and light debris status, with essentially no limitations on possible commitment of fire-fighting personnel. Subsequent parts of this section discuss fire operations for the example case.

## 6.2 INITIAL FIRE SITUATION AND ACTIONS

In the example selected for this study, communications (radio, landlines,\* telephone, and teletype) are assumed intact at the time the fires occur in the city. Radio will be the main means of communication used by fire fighters and fire dispatchers and EOC personnel.

The initial fire situation in San Francisco following explosion of the 5-megaton nuclear weapon near Richmond is approximated by Fig. 7 (Subsection 5.3). In the area north of the arc marked  $25 \text{ cal/cm}^2$ , 5 to 6 out of every 10 structures are assumed to be burning. Between the arcs marked  $25 \text{ cal/cm}^2$  and  $16 \text{ cal/cm}^2$ , the Presidio and eastward to the shore, plus the area south of Market Street, are heavily fire involved. Other areas within the 16 and  $25 \text{ cal/cm}^2$  arcs have fewer than 1 to 2 fires per 100 structures, because of shielding from thermal radiation by hills and high buildings. The basic fire-fighting strategy for the example chosen is based on these allocations of initial fires.

All prescribed actions for Readiness Conditions 3, 2, and 1 (see Subsections 3.2 and 3.3) will have been accomplished and Fire Department personnel are assumed to have been in shelters (at their fire stations) at the time of weapon burst. Initial postattack actions include the following:

1. Evacuation of fire apparatus and personnel from areas made untenable by initial fires to the Fire College Assembly area (see Fig. 7).

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\* Landlines as used here refer to underground telephone and telegraph cables.

2. Respond to alarms in accordance with instructions from the dispatcher at the Central Fire Alarm Office (see Fig. 7).

### 6.3 FIRE INFORMATION FOR FIRE-FIGHTING OPERATIONS

#### 6.3.1 General

In San Francisco, fire personnel on duty in the EOC are equipped by means of radio to monitor all incoming and outgoing radio messages of the Central Fire Alarm Office. This is the primary way in which EOC personnel keep apprised of the external situation in the city. Throughout the firefighting phase, EOC fire personnel will monitor, analyze and plot fire information on the map in the EOC. Other EOC officials (police, medical, public works, etc.) will be able to refer to the map for needed data or request additional information from the fire officials in the EOC. In some cities, the daily routine dispatching function is performed in the EOC. In these cities (not including San Francisco), the Central Fire Alarm Office is in effect located in the EOC.

Immediately following a nuclear explosion near San Francisco, numerous alarms are anticipated. Since line-load control will be in effect (thus preventing extraneous telephone alarms), the majority of these alarms will originate in fire-alarm boxes located on street corners throughout the city. Controlled-response dispatches (described in Subsection 4.2.2) will be made by dispatchers on duty at the Central Fire Alarm Office. Initial radiological reports from the fixed monitoring stations located at the 11 Fire Battalion Headquarters will begin to flow into the Central Fire Alarm Office (also into the EOC). In the example studied, these reports will be negative. Transmission of radiological reports can be expected when the fallout radiation level exceeds 0.5 r/hr.\*

Meanwhile, the Fire Department Chief at the Emergency Operating Center will ask the Military Liaison Officer (MLO in the EOC) to request helicopters from the military. The MLO will contact the Coast Guard at San Francisco International Airport (by landline or radio), stating for example the following:

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\* EOC personnel will be in contact with both the Weather Bureau and the military who will be tracking the radioactive cloud from the explosion. If the wind or another condition makes a severe radiation hazard an imminent threat, notice will be given to the dispatcher to order all fire units to "SEEK SHELTER."

Request two helicopters for airborne fire survey.

Request pilots rendezvous with Fire Chief and Deputy Chief at Kezar Stadium.

If the Coast Guard is unable to comply with the request for helicopters, the same request will be made to the Army at the Presidio. In the present case, the assumption is made that the helicopters are available. (In some cities, fire departments and police departments own helicopters; in almost all cities, provisions can be made prior to an attack for availability of helicopters from military, public, or private sources.)

The Fire Chief and Deputy Chief will perform a fire sizeup of the overall situation from helicopters. Layman<sup>11</sup> defines sizeup as, "the mental evaluation made by the operational officer in charge of a fire or other emergency which enables him to determine his course of action and to accomplish his mission." From airborne vantage points, the Chief and Deputy Chief will be able to formulate basic fire-fighting strategy based upon their assessment of such factors as:

1. Initial location of fires.
2. Areas heavily fire involved.
3. Areas threatened by fire spread.
4. Potential firebreaks.
5. Smoke conditions.
6. Fire-unit, routing-and-positioning information for major stands against spreading fires.

Based on observations, the Chief will contact the Central Fire Alarm Office from the helicopter and assume overall command of the fire units. It is assumed that prior to this airborne sizeup, decisions as to the fundamental practicality of any fire control, and in general the scope of the operation involved (Sections 6.1.2.1 and 6.1.2.2), will have been made. Such decisions can be modified as necessary as a result of the fire sizeup.

### 6.3.2 Basic Fire-Fighting Strategy\*

The basic fire-fighting strategy or "battle plan," is the direct result of the fire sizeup. The basic fire-fighting strategy for the present example is, in brief, to attack fires from the southwest against a main line and two alternative defense lines which will hold, delay or concede as necessary. The strategy is elaborated on in the following paragraphs.

The waterfront area between Fort Mason and Pier 35 (see Fig. 7), would be indefensible because of heavy fire involvement. Initial commitment of forces would be along Van Ness Avenue and in the high ground above the waterfront area involved. Initial forces would also be committed to the arc (see Fig. 7,  $16 \text{ cal/cm}^2$  arc) from the southwest Presidio Boundary to Van Ness Avenue and Market Street. Lesser or patrol forces would be committed to the involved section south of Market Street from Van Ness Avenue to the arc continuation to China Basin. This area appears to offer more natural breaks (freeways, open areas, isolated exposures, etc.); it is therefore probable that sweeping fires could be avoided, even though individual blocks or several blocks might have to be sacrificed. (From the photographs, Figs. 8, 10, 12, 14, and 16, parts of this area would be directly exposed to thermal radiation from the Richmond explosion.)

In the area north of Market Street and east of Van Ness Avenue, patrol forces and limited force commitments might be able to take a stand and contain the fires. If this can be done and if the major force commitment along Van Ness Avenue is successful in stemming fire advance, then the major destruction will be confined to the area north of the arc ( $16 \text{ cal/cm}^2$  arc) and west from Van Ness Avenue.

The prime approach in this strategy would be to move forces into the area from the south to extinguish or bypass fires as they proceed to the north. The strong defense line would be Van Ness Avenue; the heavily fire-involved area would be limited to probing forays. The main line would be altered only as conditions dictated such action to be advisable. The width of Geary Freeway and Geary Boulevard, aided by park areas and other natural breaks in the fire zone, might well permit a lessening of the fire problem south of Geary and east to Van Ness Avenue. Under these conditions, the major effort would be directed toward advancing defense forces in a northeasterly direction against the main defense line at Van Ness Avenue in a pincers movement. Late afternoon westerly winds (the wind will shift from north by northwest to west)

\* Based on results of detailed discussions with members of the San Francisco Fire Department.

will reduce the smoke problem and permit task-force units under Chief Officer control to evaluate and extinguish or bypass fires for isolation as they progressed.

Should the main defense line at Van Ness Avenue fail to hold, the forces could retreat to the higher ground of Nob Hill with the hope of maintaining a stand along California Street. Failing this, the defense forces would swing southeast from the anchor point of Market Street and Van Ness Avenue with Market Street as the last defense line.

### 6.3.3 Typical Commands and Information for Effecting Basic Fire-Fighting Strategy

Fire-fighting strategy for the conditions specified in San Francisco are described in Subsection 6.3.1. The Fire Chief, airborne in a helicopter, will contact the Central Fire Alarm Office and begin reporting conditions observed and issuing orders for the dispatchment of fire crews. Typical reports and commands might be as follows:

"Severe fire conditions exist in the area between Fort Mason and Pier 35 and south to Telegraph Hill."

"Advise stations in heavily-involved fire areas to evacuate if they have not already done so."\*

"Make initial force commitment along Van Ness Avenue and in the high ground above the waterfront area."

"Major fires are north of an arc extending from the southwest Presidio boundary through Civic Center to China Basin."

"Commit forces from the southwest Presidio boundary to Van Ness Avenue and Market Street."

"Commit lesser or patrol forces to the area south of Market Street from Van Ness Avenue to China Basin."

"Attempt to place patrol forces north of Market Street and east of Van Ness Avenue."

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\* In these areas, station officials will probably have judged their location to be untenable and will have evacuated to a staging area.



Ideally, the Fire Chief or one of his alternates would continue to maintain airborne surveillance and command through the fire-fighting phase. Fire situations change rapidly and fire sizeup will be a continuing requirement until fires are controlled. Changes in wind direction, severe smoke conditions, firestorm development, or any of a number of other events can result in the need for revising fire strategy and repositioning firefighting units.

#### 6.3.4 Information Flow During the Fire-Fighting Phase

Command Posts, probably a maximum of three, will be established along the fire front. The Command-Post Chiefs will be the field contact points and will receive directions via the dispatcher in the Central Fire Alarm Office from the Fire Department Chief in the helicopter. Requests and reports from the fire units on the fire scene will be made to the appropriate Command-Post Chief. Requests that cannot be fulfilled by the Command-Post Chiefs and reports of conditions deemed by the Command-Post Chiefs to be significant or potentially significant will be relayed to the dispatcher in the Central Fire Alarm Office. If the information from a Command-Post Chief is in the form of a request for assistance (additional men, fire apparatus, hose, ambulance, etc.) the dispatcher will either dispatch the needed assistance or report to the requesting Command-Post Chief that his request cannot be fulfilled at the time. If the Command-Post Chief requests a command decision regarding a certain situation, the dispatcher will relay the question to the Chief in his helicopter, obtain the decision and report back to the Command Post. If the Command-Post Chief is reporting a significant situation requiring the special attention of Master Control (local designation for the EOC), the dispatcher may verify that Master Control has in fact received the information. The diagram in Fig. 17 depicts the information flow between the Fire Department Chief, the Central Fire Alarm Office, the Command-Post Chiefs, and the EOC.

Examples of the content of typical messages during the fire-fighting phase are given below:

##### EXAMPLE 1

COMMAND POST TO DISPATCHER (Central Fire Alarm Office)

"Three engines and two trucks are needed on Fulton between Gough and Divisadero."

The Central Fire Alarm Office dispatcher notes that all units shown on the status board are committed. He calls (by telephone or radio) the Fire College (assembly area for reserve units) and transmits the request. In the event that all available units (regular and reserve)

are committed, the dispatcher will notify the Command Post Chiefs and inform them that as units become available they will be reassigned where needed.

#### EXAMPLE 2

COMMAND POST TO DISPATCHER (Central Fire Alarm Office)

"Wind and smoke make Van Ness Avenue stand untenable. Men and apparatus threatened. Request command decision."

The dispatcher relays this information to the Chief in the helicopter. The chief advises:

CHIEF TO DISPATCHER: "Abandon Van Ness Avenue stand.  
Distribute units to the area  
South of Market Street."

The dispatcher relays the decision to the Command Post Chief.

#### EXAMPLE 3

COMMAND POST TO DISPATCHER (Central Fire Alarm Office)

"Water Pressure insufficient along Van Ness Avenue. Request Water Board assistance."

This type of message would require action by Master Control (EOC). The Fire Section would contact the Water Board representative, who in turn would dispatch assistance.

### 6.4 LOCAL FIRE-INFORMATION REQUIREMENTS

On the local level, the fire information required following nuclear attack can be divided into two groups according to its use:

Group I: Fire Service Information. This group includes all information needed by fire-force units directly engaged in fire fighting.

Group II: EOC Information. The EOC (Fire Section) has the passive role of monitoring, analyzing, and presenting fire information to other civil defense elements within the EOC. The EOC (Fire Section) has the active role of coordinating responses to requests for assistance beyond the normal scope of the Fire Service.

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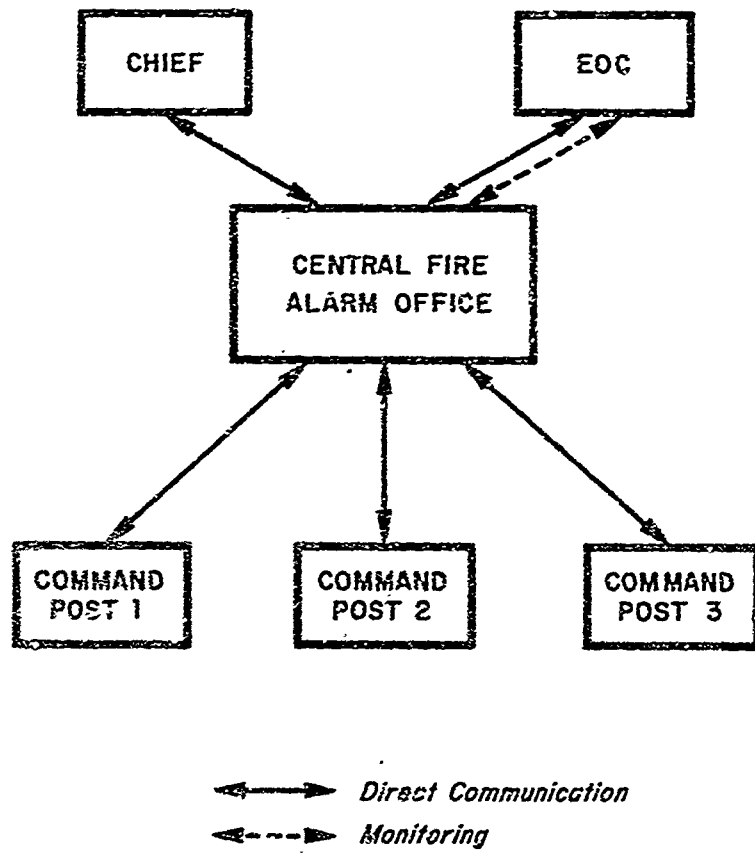


Fig. 17 Fire Information Flow

Fire information, irrespective of use destination (that is, to the Fire Service or to the EOC), will in general assume one of the following forms:

1. A directive or an order.
2. A request.
3. A report.

The frequency with which orders, requests, or reports are required is not specified in the planning documents for emergency operations following nuclear attack. For example, in an actual situation a dispatcher would when necessary restrict or limit the frequency of certain types of reports or requests. The restrictions to be imposed will be at the discretion of the responsible individual making judgments and evaluations of the actual situation. Shortly after the attack, communications centers will be overloaded with messages, even though line-load control is in effect. A dispatcher's authority to prudently restrict, limit, or establish priorities on messages flowing into a communications center is essential to the performance of effective emergency operations.

Since there is no reliable method for quantitatively estimating message frequency for fire information following nuclear attack, the terms "repetitive" or "nonrepetitive" are used in this report to describe information frequency. In Table 3, Column 1 lists typical actions or conditions potentially involving the transmittal of intelligence. Column 2 indicates the form of the information. Column 3 cites the responsible action agency: Fire Service units in the field, the EOC or both. Column 4 indicates the information frequency; "R" means the type of message is repetitive, "NR" means that the message is nonrepetitive. Table 3 cannot, of course, be considered to be an exhaustive listing of all specific contingencies in which fire information will be required. It is considered, however, that the examples given cover the range of types of fire information likely to be required and that the EOC information gathering and reporting procedures are conceptually capable of handling other unforeseen specific needs.

#### 6.5 FIRE INFORMATION USE BY THE EOC

During a firefighting operation, the Emergency Operating Center constantly monitors messages to and from the Central Fire Alarm Office. The information obtained by monitoring is analyzed, and some items, such as initial and updated fire locations are displayed on a large city map in full view of the representatives of other civil defense elements in the EOC (police, public health, Red Cross, etc.). Members of the EOC

Table 3  
TYPICAL FIRE INFORMATION

Action or Condition	Input Form	Action Agency*	Frequency
1. Fire Sizeup	Reports & Orders	FS and EOC	R
2. Mutual Aid	Request	EOC	NR or R
3. Establish Command Posts	Order	FS	R
4. Initial Distribution of Fire Units	Order	FS	NR
5. Fire Unit Reassignment	Order	FS	R
6. Additional Fire Units Needed	Request	FS	R
7. Fuel Needed for Operating Fire Apparatus	Request	EOC	NR
8. Hose Replacement	Request	FS and EOC	R
9. Water Distribution	Request	EOC	R
10. Aid for Fire Service Casualties	Request	EOC	R
11. Food Needed for Firemen	Request	EOC	NR
12. Aid for Population Casualties	Request	EOC	R
13. Transportation to Evacuate Population	Request	EOC	R
14. Wind Direction Changes	Report	FS and EOC	R
15. Firebrands	Report	FS and EOC	NR
16. Radiological Information	Report	FS and EOC	R
17. Crew Relief	Request	FS	R
18. Special Assistance	Request	EOC	R

\* FS means Fire Service Units in the field; EOC is the Emergency Operating Center

Fire Section serve as advisors on fire conditions when knowledge of fire conditions is needed to perform other emergency functions. For illustration, consider a possible case in which people in a shelter are threatened by fire. Based for example on fire information or a specific recommendation from the EOC, or on local observation of fire conditions, the shelter manager decides that evacuation offers greater survival potential than remaining in the shelter. Before evacuating the people, he calls the EOC and asks for evacuation routing instructions. Since the Police Department is responsible for vehicular and pedestrian traffic, this request will be handled by the EOC Police Section. The Police Section will check with the Fire Section regarding fire areas and smoke conditions before giving the shelter manager routing instructions.

In addition to keeping other EOC Sections apprised of fire conditions, the Fire Section is responsible for coordinating actions between the Fire Department and other agencies when such coordination is required. The manner in which coordination is accomplished can best be illustrated in the following discussions of the fire-information items listed in Table 3 that require EOC action. This illustration thus indicates that shelter managers will receive needed fire information directly from the EOC if a communication link exists or from the EOC via police messages if it does not.

1. Fire Sizeup (Table 3, Item 1). The Fire Chief will report overall fire conditions as seen from the helicopter. A member of the EOC Fire Section will note the conditions on a large map in the EOC together with a note as to the time reported. This map will be updated as conditions change and are reported by the Fire Chief.

2. Mutual Aid (Table 3, Item 2). In the early fire-fighting phase, the Chief will ask the EOC to submit a request to the regional EOC for mutual aid. The local EOC will briefly describe local fire conditions and request mutual aid (additional firemen and fire apparatus)\*. Mutual aid will not be available in the example selected for study because of the massiveness of the attack throughout the state.

3. Establish Command Posts (Table 3, Item 3.) The Fire Chief, based on his observations of the over-all fire situation, will determine the locations for initial Command posts and order them established. The order will be given via radio from the helicopter to the dispatcher in the Central Fire Alarm Office.

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\* Refer to Subsection 3.3 and Appendix A for detailed information regarding mutual aid.

4. Initial Distribution of Units (Table 3, Item 4). The Fire Chief will tell the dispatcher to position units along specified streets. The dispatcher in turn will assign the appropriate units.

5. Unit Reassignment (Table 3, Item 5). Fire fighting units which have succeeded in controlling fires in an area of the city or which have ceased fire fighting because their position has become untenable will be reassigned to assist other fire fighting units.

6. Additional Units Needed (Table 3, Item 6). The request for additional units will be from the fire-unit command posts to the dispatcher in the Central Fire Alarm Office. In the early hours of fire fighting, all available units will probably have been committed and the dispatcher will advise the command post chiefs of this fact. As units become available, the dispatcher will reassign them.

7. Fuel needed for operating fire apparatus (Table 3, Item 1). Local emergency planning requires that fuel and trucks for transporting fuel be available. The EOC (Transportation Section) will provide fuel for operating fire equipment at the request of the Fire Department.

8. Hose replacement (Table 3, Item 8). Fire hoses can easily be damaged to the point of being unusable when burning debris falls on a portion of hose and burns through it. The San Francisco Fire Department maintains a reserve supply of fire hose for emergency use. If the Fire Department exhausts this supply, the EOC will be asked to obtain additional fire hose.

9. Water distribution (Table 3, Item 9). The Water Department routinely responds to multiple-alarm fires. Emergency planning calls for Water Department personnel to be available on the fire scene as required to assist in opening or closing mains to control water distribution. The EOC Fire Section will contact the Water Department and request that aid be dispatched to the locations requesting assistance.

10. Aid for Fire-Service Casualties and Population (Table 3, Items 10 and 12). Emergency planning provides for the positioning of ambulances along the fire periphery prior to a specific request for casualty aid. However, the total number of county ambulances in San Francisco is six. During an emergency, private or perhaps military ambulance companies are enlisted to assist Civil Defense. The EOC will make the necessary contact to obtain medical aid for the injured.

11. Food needed for firemen (Table 3, Item 11). Emergency planning requires that the Red Cross provide food for emergency personnel on duty. If this service is inadequate, the EOC will resolve the problem.

12. Transportation to evacuate population (Table 3, Item 13). Pedestrian and vehicular traffic control is, according to planning, the responsibility of the Police Department. However, in the absence of the Police, a ~~second~~ Post Fire Chief would probably request either police assistance for population control or for transportation to evacuate the people from the fire area.

13. Wind direction changes (Table 3, Item 14). The EOC will record significant wind data as they are reported both by firefighters and the Weather Bureau.

14. Firebrands (Table 3, Item 15). The Fire Department will probably request the EOC to advise citizens to watch for firebrands and to immediately extinguish small fires started by brands.

15. Radiological information (Table 3, Item 16). The Fire Section will furnish radiological reports from fire battalions to the RADEF officer in the EOC. Areas in which radiation is a hazard will be plotted on the map in the EOC.

16. Crew Relief (Table 3, Item 17). Fires may be fought for several days in the city, following nuclear attack. The Fire Chief may hold some crews in reserve in the beginning to relieve fire fighters who have been working ten or twelve hours. However, requests for relief may be made by command-post chiefs at either earlier or later times.

17. Special assistance (Table 3, Item 18). Under certain conditions, a Fire Chief may decide that the best method of halting fire advance is by the use of explosives to create firebreaks. The Chief would then contact the EOC with a request for explosives and an explosive expert. The EOC would then contact the Military to assist in fulfilling the Chief's request.

#### 6.6 FIRE INFORMATION FOR HIGHER ECHELONS OF CIVIL DEFENSE

The state-level and regional-level EOC's will receive requests for mutual aid for fire fighting from communities throughout the state. Every effort will be made by the state to respond to the requests. In addition to receiving requests for mutual aid, the state will be gathering fire information by monitoring fire channels in various cities throughout the state. This information will be summarized for the governor and the OCD Regional Office. After the fires have been extinguished (or have burned out), damage surveys will probably be conducted in target areas. Fire damage will be included in survey reports which will provide Civil Defense on the Regional and Federal levels with



postattack information. There is no apparent requirement either trans-attack of postattack for detailed information at the state and Federal levels.

#### 6.7 GENERALITY OF THE EXAMPLE USED

A specific case (San Francisco) and a specific assumed attack have been used to add realism to the present study, in order to elicit planning information from experienced fire-control personnel. As previously noted, the example was carefully chosen to provide maximum returns in terms of information requirements.

It is considered that the conclusions drawn in this report, summarized in Chapter 7, are in fact applicable in general terms to other urban areas of the nation. In any assessment of information requirements, it is the chain of decision processes which must be examined. If this chain can be completely established, and can be expected to be similar from case to case, then the differences in requirements will lie in details rather than in kind, in the absence of some requirements in certain cases, and in the availability and collection processes for the information sought. Such a situation occurs in the present study.

Based on the surveys made and discussions held, during the course of this study, it is apparent that in attempting to control fires engendered by a nuclear attack, the following decision chain will exist in any local jurisdiction affected:

1. Decision as to practicality of any fire-control measures.
2. Estimate as to overall scope of operation (needed and possible).
3. Requirement for mutual aid.
4. Continuous operational decisions covered with carrying out operation.
5. Decisions as to support requirements from other EOC participants.
6. Decisions by other EOC participants requiring fire information for planning.
7. Decision to abandon or terminate the operation.
8. Postattack estimates of fire-produced damage for recovery planning.

The purpose of identifying fire-information requirements is to serve as a tool for preattack planning, in order to prevent overlooking of feasible measures that can be taken before an attack to insure most effective postattack operations. To carry this process to its logical conclusion requires studies on the local jurisdictions themselves. But to the extent that such information assessments can be performed in general terms, the case discussed in the present report serves as an adequate basis for generalizations which will prove extremely useful to any more detailed locally performed assessments of information requirements.

## SECTION 7

### CONCLUSIONS AND RECOMMENDATIONS

#### 7.1 GENERAL

Fire information required in cities following nuclear attack will depend upon the effects of the weapon detonated and the activities or operations to be performed by civil defense personnel (particularly the Fire Service) following the attack. Because of the wide variations in the expected fire-fighting conditions, it is not realistic to predict the specific volume of fire-information messages, although it may be expected to be high. The maximum information will be required for the minimum fallout and blast-damage conditions. It is clear that, as conditions become worse (e.g., if mass fires get out of control), the volume and detail of required fire information will decrease because the fires will become increasingly beyond the capability of the remaining forces, supplies and equipment to perform useful actions.

#### 7.2 REQUIREMENTS - LOCAL, STATE AND FEDERAL

Fire problems are essentially the responsibility of the smallest political jurisdiction in which they occur. Hence, civil defense elements requiring transattack and postattack fire information are primarily at the local level. State-level civil defense requires fire information in order to effect mutual aid where possible (probably not feasible in a massive nuclear attack). Federal-level civil defense will have an interest in overall damage assessment data after fires in cities are controlled. These data will provide Federal civil defense personnel with the necessary criteria for apportioning support and relief to disaster areas during the postattack recovery period. The overall effectiveness of postattack civil defense operations is greatly increased if means of communicating emergency information are available.

#### 7.3 LOCAL FIRE INFORMATION

Information requirements at the local level will fall into four categories of use. These are: (1) sufficient early information (strike reports, fallout and blast damage estimates, damage to fire personnel

and equipment, etc.) to permit an initial decision as to the inherent practicality of fire-control operations, and in general the scope of such operations; (2) the early fire sizeup, permitting initial detailed planning of fire-control strategy; (3) continuing information permitting effective carrying out of the fire-control operation; and (4) coordinative information to assure cooperative efforts among such participants in the EOC as police, water department, etc.

Typical information requirements for the latter three categories have been summarized in Table 3. A "request" may be interpreted as information that a need exists; an "order" may be interpreted as information from command to a subordinate unit indicating a desirable course of actions.

Additional conclusions of the study are as follows:

Airborne observation and command capability by the Fire Department Chief of the overall fire situation are highly desirable for firefighting operations.

Line-load control of telephone service for civil defense promises to be an excellent means of reducing the amount of unnecessary information that would otherwise hamper fire fighting and civil defense operations.

There is no realistic method for quantitatively defining fire information that will be needed by various elements of civil defense (other than fire fighters). The most important use of early fire information would be in the consideration of relocation of shelter inhabitants. Monitoring of fire information by the EOC Fire Section allows other EOC civil defense elements to keep apprised of the fire situation without requiring additional reporting channels or placing the burden of formal reporting requirements on Fire Command Post Chiefs and Central Fire Alarm Office dispatchers.

The preattack use of aerial photography and photointerpretation is technique useful in the prediction of thermal ignition exposures.

1. Results of this technique could also be used for preattack planning by local Fire Departments to lay out a few general strategies that might be expected to be most useful.

2. Such photointerpretation could also be used to construct fire-estimating models to be used in conjunction with other damage-assessment models.

Preattack planning for large scale fire-control operations will enhance the possibility of effective performance in the transattack and postattack periods.

#### RECOMMENDATIONS

1. Since local conditions (topography, distribution of fuel, availability of access routes, availability of firefighting personnel, equipment, and water, proximity to military bases, etc.) will be overwhelmingly significant in determining details of fire-information requirements for specific cases and specific assumed attacks, it is recommended that further studies of this type be relegated to those involved in planning at the local EOC level.

2. In any such studies, the use of aerial photography and photo-interpretation (to obtain a bomb's-eye view of the region of concern), will be a very useful technique and should be used.

3. Planning for postattack operations should incorporate the concept that fire information needed by the EOC's should be obtained in the transattack and early postattack phases of an attack through intimate contact with the fire-control operation itself (which is the responsibility of the existing community fire departments), and constant monitoring of the Fire Department radio channels. Separate reporting systems for such information should not be establishing.

4. In combatting fires of the extent expected in a nuclear attack, the communications burden will be extremely high. Consequently, consideration should be given in planning by all communities to the line-load control method described in the report.

APPENDIX A

The text of the State of California Master Mutual Aid Agreement is quoted in this Appendix.

"This agreement made and entered into by and between the STATE OF CALIFORNIA, its various departments and agencies, and the various political subdivisions, municipal corporations, and other public agencies of the State of California:

WITNESSETH

WHEREAS, It is necessary that all of the resources and facilities of the State, its various departments and agencies, and all its political subdivisions, municipal corporations, and other public agencies be made available to prevent and combat the effect of disasters which may result from such calamities as flood, fire, earthquake, pestilence, war, sabotage, and riot; and

WHEREAS, It is desirable that each of the parties hereto should voluntarily aid and assist each other in the event that a disaster should occur, by the interchange of services and facilities, including, but not limited to, fire, police, medical and health, communication, and transportation services and facilities, to cope with the problems of rescue, evacuation, rehabilitation, and reconstruction which would arise in the event of a disaster; and

WHEREAS, It is necessary and desirable that a cooperative agreement be executed for the interchange of such mutual aid on a local, county-wide, regional, state-wide, and interstate basis;

NOW, THEREFORE, IT IS HEREBY AGREED by and between each and all of the parties hereto as follows:

1. Each party shall develop a plan providing for the effective mobilization of all its resources and facilities, both public and private, to cope with any type of disaster.

2. Each party agrees to furnish resources and facilities and to render services to each and every other party to this agreement to prevent and combat any type of disaster in accordance with duly adopted mutual aid operational plans, whether heretofore or hereafter adopted, detailing the method and manner by which such resources, facilities, and services are to be made available and furnished, which operational plans may include provisions for training and testing to make such mutual aid effective; provided, however, that no party shall be required to deplete unreasonably its own resources, facilities, and services in furnishing such mutual aid.

3. It is expressly understood that this agreement and the operational plans adopted pursuant thereto, shall be without reimbursement unless otherwise expressly provided for by the parties to this agreement or as provided in Sections 1541, 1586, and 1587, Military and Veterans Code; and that such mutual aid is intended to be available in the event of a disaster of such magnitude that it is, or is likely to be, beyond the control of a single party and requires the combined forces of several or all of the parties of this agreement to combat.

4. It is expressly understood that the mutual aid extended under this agreement and the operational plans adopted pursuant thereto shall be available and furnished in all cases of local peril or emergency and in all cases in which a STATE OF EXTREME EMERGENCY has been proclaimed.

5. It is expressly understood that any mutual aid extended under this agreement and the operational plans adopted pursuant thereto, is furnished in accordance with the "California Disaster Act" and other applicable provisions of law, and except as otherwise provided by law that: "The responsible local official in whose jurisdiction an incident requiring mutual aid has occurred shall remain in charge at such incident including the direction of such personnel and equipment provided him through the operation of such mutual aid plans." (Section 1564, Military and Veterans Code.)

6. It is expressly understood that when and as the State of California enters into mutual aid agreements with other states and the Federal Government that the parties to this agreement shall abide by such mutual aid agreements in accordance with law.

7. Upon approval or execution of this agreement by the parties hereto all mutual aid operational plans heretofore approved by the State Disaster Council, or its predecessors, and in effect as to some of the parties hereto, shall remain in full force and effect as to them until the same may be amended, revised, or modified. Additional mutual aid operational plans and amendments, revisions, or modifications of existing or hereafter adopted mutual aid operational plans, shall be adopted as follows:

- a. County-wide and local mutual aid operational plans shall be developed by the parties thereto and are operative as between the parties thereto in accordance with the provisions of such operational plans. Such operational plans shall be submitted to the State Disaster Council for approval. The State Disaster Council shall notify each party to such operational plans of its approval, and shall also send copies of such operational plans to other parties in this agreement who did not participate in such operational plans



and who are in the same area and affected by such operational plans. Such operational plans shall be operative as to such other parties 20 days after receipt thereof unless within that time the party by resolution or notice given to the State Disaster Council, in the same manner as notice of termination of participation in this agreement, declines to participate in the particular operational plan.

- b. State-wide and regional mutual aid operational plans shall be approved by the State Disaster Council and copies thereof shall forthwith be sent to each and every party affected by such operational plans. Such operational plans shall be operative as to parties affected thereby 20 days after receipt thereof unless within that time the party by resolution or notice given to the State Disaster Council, in the same manner as notice of termination of participation in this agreement, declines to participate in the particular operational plan.
- c. The declination of one or more of the parties to participate in a particular operational plan or any amendment, revision, or modification thereof, shall not affect the operation of this agreement and the other operational plans adopted pursuant thereto.
- d. Any party may at any time by resolution or notice given to the State Disaster Council, in the same manner as notice of termination of participation in this agreement, decline to participate in any particular operational plan, which declination shall become effective 20 days after filing with the State Disaster Council.
- e. The State Disaster Council shall send copies of all operational plans to those state departments and agencies designated by the Governor. The Governor may upon behalf of any department or agency give notice that such department or agency declines to participate in a particular operational plan.
- f. The State Disaster Council, in sending copies of operational plans and other notices and information to the parties to this agreement, shall send copies to the Governor and any department or agency head designated by him; the chairman of the board of supervisors, the clerk of the board of supervisors, and County Disaster Council, and any other officer designated by a county; the mayor, the clerk of the city

council, the City Disaster Council, and any other officer designated by a city; the executive head, the clerk of the governing body, or other officer of other political subdivisions and public agencies as designated by such parties.

8. This agreement shall become effective as to each party when approved or executed by the party, and shall remain operative and effective as between each and every party that has heretofore or hereafter approved or executed this agreement, until participation in this agreement is terminated by the party. The termination by one or more of the parties of its participation in this agreement shall not affect the operation of this agreement as between the other parties thereto. Upon approval or execution of this agreement the State Disaster Council shall send copies of all approved and existing mutual aid operational plans affecting such party which shall become operative as to such party 20 days after receipt thereof unless within that time the party by resolution or notice given to the State Disaster Council, in the same manner as notice of termination of participation in this agreement, declines to participate in any particular operational plan. The State Disaster Council shall keep every party currently advised of who the other parties to this agreement are and whether any of them has declined to participate in any particular operational plan.

9. Approval or execution of this agreement shall be as follows:

- a. The Governor shall execute a copy of this agreement on behalf of the State of California and the various departments and agencies thereof. Upon execution by the Governor a signed copy shall forthwith be filed with the State Disaster Council.
- b. Counties, cities, and other political subdivisions and public agencies having a legislative or governing body shall by resolution approve and agree to abide by this agreement, which may be designated as "CALIFORNIA DISASTER AND CIVIL DEFENSE MASTER MUTUAL AID AGREEMENT." Upon adoption of such a resolution, a certified copy thereof shall forthwith be filed with the State Disaster Council.
- c. The executive head of those political subdivisions and public agencies having no legislative or governing body shall execute a copy of this agreement and forthwith file a signed copy with the State Disaster Council.

10. Termination of participation in this agreement may be effected by any party as follows:

- a. The Governor upon behalf of the State and its various departments and agencies, and the executive head of those political subdivisions and public agencies having no legislative or governing body, shall file a written notice of termination of participation in this agreement with the State Disaster Council and this agreement is terminated as to such party 20 days after the filing of such notice.
- b. Counties, cities, and other political subdivisions and public agencies having a legislative or governing body shall by resolution give notice of termination of participation in this agreement and file a certified copy of such resolution with the State Disaster Council, and this agreement is terminated as to such party 20 days after the filing of such resolution.

IN WITNESS WHEREOF this agreement has been executed and approved and is effective and operative as to each of the parties as herein provided."

## APPENDIX B

The text of the Federal Civil Defense Guide, Part G, Chapter 3 of April 1965, "Military Assistance to Civil Defense" is quoted in this Appendix.

## MILITARY ASSISTANCE TO CIVIL DEFENSE

Modern warfare has created a condition wherein the entire resources of the Nation must be included in defense plans. Along with military defense and retaliatory forces, civil defense is a vital element of the Nation's total defense. Together, they not only stand as a strong deterrent to war, but constitute the greatest assurance of peace. Because of this close relationship, there is a need for coordination and cooperation between the civil defense program and the military program. Consequently, the Federal civil defense organization was placed in the Department of Defense; and later, because the program was essentially operational, it was placed under the Secretary of the Army.

### General Policy

The Secretary of Defense approved the general policy for military support to civil authorities on April 23, 1963 (DoD Directive 3025.10), and described such support as "an emergency task within the mission of all Federal active duty and reserve units of the military services." The policy directive emphasized that military assistance would not be a substitute for civil defense operations, but would complement such operations.

### Military Mission

In the event of a national emergency involving a nuclear attack on the United States, the Armed Forces will employ available resources, which are not required at that time for offensive or defensive operations, to assist civil authorities to restore order and civil control, return essential facilities to operation, prevent unnecessary loss of life, alleviate suffering, and take other actions as directed to insure national survival and a capability on the part of the Nation to continue the conflict. In such employment, established military organizational channels and prearranged plans will be followed when possible.

## Tasks

Specifically assigned tasks within the mission include:

1. Providing for coordination and control, both preattack and postattack, at Zone of the Interior Army and State level of the utilization of military (active or reserve) capabilities and available resources.

2. Training military forces in the basic function of civil defense operations, and utilizing to the maximum extent present training facilities and courses in civil defense agencies.

3. Making provisions for installation or station commanders to render immediate and independent support to local civil defense authorities; and, in situations where civilian control is no longer effective, taking necessary measures for the preservation of order and the protection of life and property.

4. Developing and maintaining plans and capabilities as necessary to assist civil authorities in time of emergency in restoring Federal, State, and local civil operations. Such interim emergency assistance will be in coordination with and supplementary to the capabilities of State and local governments and other nonmilitary organizations, and will be concerned with the following categories of assistance:

- a. Restoration of facilities and utilities including transportation, communications, power, fuel, water, and other essential facilities and utilities.
- b. Emergency clearance of debris and rubble, including explosive ordnance, from streets, highways, rail centers, dock facilities, airports, shelters, and other areas, as necessary to permit rescue or movement of people, access to and recovery of critical resources, emergency repair or reconstruction of facilities, and other emergency operations.
- c. Fire protection.
- d. Rescue, evacuation, and emergency medical treatment or hospitalization of casualties, the recovery of critical medical supplies, and the safeguarding of public health. This may involve sorting and treating of casualties, and preventive measures to control the incidence and spread of infectious diseases.
- e. Recovery, identification, registration, and disposition of deceased personnel.

- f. Radiation monitoring and decontamination to include identifying contaminated areas, and reporting information through The National Warning System (NAWAS). Initial decontamination will, of necessity, be directed primarily at personnel and vital facilities.
- g. Movement control, to include plans and procedures for essential movements.
- h. Maintenance of law and order, to include:
  - (1) General police and law-enforcement operations.
  - (2) Emergency highway traffic control and supervision.
  - (3) Security and protection of vital facilities and resources.
  - (4) Enforcement of economic stabilization measures, as may be required in the immediate postattack phase.
- i. Issue of food, essential supplies, and materiel: to include collection, safeguarding, and issue of critical items in the initial postattack phase.
- j. Emergency provision of food and facilities for food preparation, should mass or community subsistence support be required.
- k. Damage assessment.
- l. Provision of interim communications, utilizing available mobile military equipment to provide command and control.

#### Other Types of Support

OCD's close relationship with the military departments has facilitated support of civil defense by the military departments and DoD agencies which is additional to the type of support outlined above. Examples of such additional support are:

- 1. National Fallout Shelter Survey conducted by the Army Corps of Engineers and the Navy Bureau of Yards and Docks.
- 2. Communications support by the U.S. Army Strategic Communications Command.

3. Library service, and printing and distribution of publications, by the Army Adjutant General.

#### Responsibilities and Relationships

The responsibility and authority for developing programs and for organizing and directing the civil defense of the United States have been delegated to the Director of Civil Defense who reports directly to the Secretary of the Army. The OCD headquarters and regional staffs are civilian and will remain so. They will continue to manage the Federal civil defense program and its relations with the State and local civil defense programs. (See chart, page 6, which diagrams CD-military coordinating relationships.)

In the discharge of the military mission of assistance to CD, the Joint Chiefs of Staff and the Secretaries of the Military Departments, in coordination with the Director of Civil Defense, will take the necessary actions to carry out the tasks enumerated above. Directives have been issued by the Joint Chiefs of Staff which make the Commanding General, U.S. Continental Army Command, responsible for planning and conducting of operations for the ground defense of the continental United States, including military support of civil defense. He does this through his six subordinate Army commanders and the State Area Military Headquarters (when established). Appropriate Naval and Air Force commanders cooperate with the U.S. Army commanders in the accomplishment of the mission.

Defense--including military support of civil defense--of all overseas areas, including Alaska, is the responsibility of the Unified Command in which the areas are located.

#### Organization at State Level

A multi-service State-level military headquarters for military support of civil defense has been approved for the 48 contiguous States. The States Adjutants General Headquarters and Headquarters Detachments are being augmented by federally funded personnel for this purpose. Each State Adjutant General will work in close coordination with the State Civil Defense Director to insure that military support is based on State and local civil defense plans as far as possible.

In carrying out this mission, the State AG will be responsible, under the supervision of the appropriate Continental U.S. Army Commander, for planning the use of military resources of all the services within the State made available to him for support of civil defense.



In the event of a nuclear attack, the State AG and the necessary elements of his headquarters would be called into Federal service. The State AG would then come under the command of the Zone of the Interior Army Commander in whose area he is located and would have operational command of the military resources (reserve and active) made available for the military support mission.

The State Area Military Headquarters provides an ideal means of coordinating State and Federal organizations. During the premobilization phases, the Governor of each State, through his Adjutant General, will be fully aware of the planning which will affect his State. After mobilization, a familiar means of coordination will exist between the Governor and the senior military authority with responsibility within the State area.

#### Planning and Operations Below State Level

Existing plans for military support of civil authorities in a civil defense emergency provide for assistance to the major metropolitan areas. As the State military headquarters organize for the mission of civil defense support, the metropolitan complex plans will be supplemented by area-type plans which will provide military assistance where it is most urgently needed in an emergency. Until reorganization is completed and new plans are made, State and local civil defense directors should seek information and instructions concerning military support from the civil defense office from which they normally take their guidance. Contacts already established will be maintained, however, until further instructions are received from the OCD Regional Director through the State Civil Defense Director.

Base Plans on Existing Areas.--The guidance furnished to the States Adjutants General provides that military support plans should be based, so far as possible, on existing State operational areas for civil defense. Military headquarters, to the extent that they are available, and as deemed practicable, will be assigned to each operational area. In cases where metropolitan areas cross State lines, as in Kansas City, Mo., and Kansas City, Kans., one military headquarters may be assigned to coordinate military support in the entire metropolitan area. Where this is done, military-support plans will be coordinated with the appropriate OCD Regions and States.

Postattack Operations.--Postattack operations are visualized by the military as follows:

"Immediately following the nuclear attack, commanders of all services should assess their situations and determine their requirements

for military forces to execute retaliatory and defensive operations and to support these operations. They should also determine requirements for forces necessary to restore vital installations and facilities required to support future operations. Such forces remain under the command jurisdiction of the commander or service concerned and are not available for military support operations. The forces not required for the vital missions outlined above are available to conduct military support operations and should be immediately reported to the ZI Army Commander through channels established in preattack plans or otherwise as the situation dictates.

"During this period of reorganization, all survivor units and individuals should support the nearest functioning civil defense organization unless they are assigned missions falling within the categories discussed above.

"Surviving forces should execute preattack plans for military support to the fullest practicable extent. These plans may require modification. The following actions should be taken in accordance with preattack plans to the fullest extent possible. Where these actions are not previously planned, they should be accomplished by expedient measures:

"1. Each unit and individual should report to his place of duty or a predesignated assembly point. \* \* \* Assembly point . . . commanders should be predesignated and prepared to receive and organize task forces from individual military stragglers whose units are destroyed.

"2. Predesignated task forces which are placed under the operational command of the State Area Commander should be committed automatically upon nuclear attack to military support missions, as provided for in preattack plans.

"3. Survivor units at assembly points . . . may be committed as needed until higher authority directs otherwise.

"All military support commanders should insure that military forces and resources made available for support of civil defense remain at all times under military command and control.

"As command and communications are restored, forces available will be placed under operational command of the State Area Commander or withdrawn to perform essential military operations.

"Requests for postattack military support should be channeled to the nearest military unit having a support capability. If support is not available locally, requests should be referred to the next higher

headquarters through appropriate available channels. Requests passed to the ZI Army Commander by OCD may require withdrawal of forces from one operational area in order to support a more serious situation in another area. In situations where military commanders are isolated from higher headquarters they will accept and act on requests from local civil defense officials."

#### Application of Military Resources at Local Levels

The magnitude of the task of survival operations visualized in a civil defense emergency is so great that success depends upon the full mobilization of total civilian resources. Military resources, since they are a very small fraction of requirements, even if wholly devoted to civil defense support, would be inadequate to the task. Additionally, in view of priority military requirements and degree of survival, plans must be made contingent upon their availability. Even when committed to support of civil defense operations, military resources would be subject to withdrawal to meet urgent military requirements.

Civil defense and other civilian authorities must therefore understand that military support will not replace civilian participation in civil defense except in those extreme cases where the civilian capability has been destroyed or is otherwise unable to act. In those cases, restoration of civil authority and control is the primary objective so that military forces can be withdrawn to carry out urgent military tasks.

However, since military resources are highly organized and responsive to emergency-type employment, they can be used to best advantage where the need is greatest. Plans for their use must therefore be flexible so that they can be used selectively to accomplish the more urgent missions.

With the establishment of the State-level military headquarters and the increased planning and training activity resulting therefrom, there is a possibility that local authorities may interpret this as a release from their responsibilities for a civil defense program. Civil defense directors must therefore be alert to counter such erroneous conclusions. It must also be borne in mind that it is possible that military commanders might call upon local civilian resources in the accomplishment of military missions.

### Civil Defense Programs of Military Installations

Fallout Shelter. -- Military installation commanders have been directed through appropriate service directives to establish survival programs comparable to those recommended by OCD for local communities. These programs are in addition to a more comprehensive plan for passive defense which specifically provides for survival of priority military forces, equipment, supplies, and facilities necessary for carrying out military operations. However, like the community fallout shelter programs, these programs have as their objective the survival of all personnel on the installation including civilians and dependents as well as military personnel not covered by passive defense plans. Installation commanders have also been directed through military command channels to coordinate their programs with local civil defense programs in order to attain the national civil defense objective of fallout shelter protection for the total population; and, in general, the OCD procedures for the marking and stocking of shelters have been adopted by the military departments for use on military installations. Policy guidance to the military also provides that excess space on military installations will be made available for use of unsheltered persons from adjacent areas. Conversely, in the event that available shelter is inadequate to meet the demands of the military installation, the military commander will arrange with the local civil defense authorities for use of any excess shelter they may have. Local civil defense authorities should meet with the military installation commander to work out detailed plans for the use of available community fallout shelter.

Warning. -- The Department of Defense, through policy statements, has directed that the outdoor warning systems on military installations use the same signals for other than military alerting that are prescribed by OCD; i.e., a three to five minute steady tone, known as the "attention or alert signal.\*" Also directed is that the military identify areas contaminated by fallout and report over The National Warning System. In addition, military representatives are members of the Regional Civil Defense Coordinating Boards whose scope includes the formulation of emergency plans by all Federal agencies, State agencies, and local agencies. One of the functions includes warning the public.

Radiological Monitoring and Reporting. -- Military installation commanders have been directed through appropriate service directives and regulations to establish a monitoring and reporting capability. This capability is required to support military plans, and in addition will provide information to the local civil defense officials. Responsibilities and procedures for the appropriate exchange of monitored data at all levels--local, area, region--have been established. Each installation commander has been directed through military command channels to

\* Information derived from a Memorandum for State and Local Civil Defense Directors dated December 1966.

coordinate his efforts with the local civil defense director. In general, the military installations have adequate monitoring equipment. However, OCD monitoring equipment can be made available to the military either as stockage for public shelters or to equip a monitoring station established on an installation and reporting into the OCD system. Local CD authorities should take the initiative with the military installation commander to work out detailed plans for the exchange of monitored data.

Training and Education.--In those communities in which military installations are located, opportunity exists for cooperative training and education activities between the military and local civil defense. In carrying out their responsibilities for the protection of their military personnel, dependents, and civilian employees from the hazards of radioactive fallout, installation commanders will be interested in such OCD courses as shelter management, radiological monitoring, and rescue. They may also wish to take advantage of the Medical Self-Help and Civil Defense Adult Education Programs. Direct coordination between local civil defense and military installation commanders is encouraged to explore the possibility of joint military-civilian training in these areas, to be conducted by either qualified military or civilian instructors. Some Army installations are already training civilian radiological monitors for local civil defense.

#### Military Standby Reserve Officers

Procedures for requesting and utilizing military standby reserve officers in civil defense are outlined in part B, chapter 2, appendix 3, of the Federal Civil Defense Guide.

#### REFERENCES

1. OCD Professional Guide Series PG-80-7, Emergency Operating Procedures, January 1964.
2. "OCD Guide for Participants, Five City Study," Systems Evaluation Division, Research Directorate, Office of Civil Defense, 1 May 1965 (Restricted Availability).
3. Federal Civil Defense Guide, Part A, Chapter 2, January 1965.
4. Federal Civil Defense Guide, Part B, Chapter 1.
5. "Fire and Rescue Service," State Fire Disaster Plan.
6. State of California Civil Defense and Disaster Plan, Part II, Attachment A, and Part III.
7. Federal Civil Defense Guide, Part G, Chapter 3, of April 1965.
8. Encyclopedia Americana, 24 - 241.
9. J. R. Rempel, "Overpressure Data for 5-City Study," SRI Memorandum to Dr. Mathew G. Gibbons, USNRDL, 26 July 1965 (U).
10. S. Martin and S. Holton, "Preliminary Computer Program for Estimating Primary Ignition Ranges for Nuclear Weapons," USNRDL-TR-866, 3 June 1965.
11. Layman, Lloyd, Fire Fighting Tactics, p. 13, National Fire Protection Association, Boston, Mass., 1953.